AN EMPIRICAL EXPLANATION OF MANAGEMENT ACCOUNTING CHANGE:

MALAYSIAN MANUFACTURING ORGANISATIONS

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DECLARATION

I declare that this thesis has been composed by me, all work reported in it is my own and has not been submitted for any degree or professional qualification except as specified.

20th August 2003

Suzana Sulaiman

Edinburgh

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ABSTRACT

This is a study of management accounting control system (MACS) changes in Malaysian manufacturing organizations. It both replicates and extends the MACS change model developed in Libby and Waterhouse's (1996) exploratory study in Canadian manufacturing firms and in Williams and Seaman's (2001) Singapore study. Comparisons are made between these two studies and the Malaysian results. The analysis confirms that most changes in MACS are incremental or evolutionary rather than revolutionary. The great variety of changes and causes demonstrates that management accounting change is not a uniform phenomenon as is often implicitly assumed in the literature. The introduction of several new independent variables (change causal factors) does improve the original model's explanatory power significantly. However this improved model does not explain how the changes take place. A case study was therefore designed to complement the survey. In general the results of the case study provide support for the management accounting change literature and the survey findings.

PREFACE

Studying management accounting change has been a rich and fulfilling experience. Researching one of the important areas in management accounting has given me the opportunity to adopt both, the survey and the case study. Using both research methodologies method has helped me to develop my research skills. As a result of this research project, I have been fortunate to publish an article in the Akauntan Nasional, Journal of the Malaysian Institute of Accountants (Nov/Dec 2001), to present papers which have been included as proceedings papers at the 3rd Conference on New Directions in Management Accounting: Innovations in Practice and Research, Brussels (Dec 2002) and the 4th ENROAC Workshop on Management Accounting Change, Groningen, The Netherlands (May 2003) (see Appendix G).

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CHAPTER ONE

INTRODUCTION

1.1 MANAGEMENT ACCOUNTING CHANGE RESEARCH

It is not surprising that in the quest to understand management accounting in the real world setting, change has increasingly become a focus for research. The dynamics of the discipline provide a rich setting for the identification of the forces which influence and explain practice. As Burns and Scapens (2000, p.3) observe,

> ... Management accounting change has become a topic of much debate in recent years. Whether management accounting has not changed, has changed, or should change, have all been discussed

Despite much debate on this topic, management accounting change has not been explicitly defined. Indeed the exact nature of changes has often been taken for granted

by most researchers and its definition has been avoided (Quattrone and Hopper, 2001). Generally researchers focus on management accounting change as an outcome rather than emphasizing the process involved in implementing or introducing new management accounting techniques or in modifying existing methods. Management accounting change is not homogeneous, it may take many focus. Analysis shows that change can be categorized in all of the followings ways: introduction of new techniques as replacements for the existing ones; modification in the management accounting information or output; change in the technical nature of a management accounting technique or system; introduction of new techniques where no management accounting previously existed; and removal of a management accounting technique or system without replacement. Little emphasis has been given by researchers to the explanation of different types of management accounting change and to the implications of these differences for their research.

Management accounting change is not a uniform phenomenon. Consequently one might expect the causal factors of change also to be varied and this has indeed been confirmed by management accounting researchers. It is evident that both the external or environmental factors (macro-factors) or internal (micro-factors) relating to the organization concerned have influenced the recent development of new management accounting systems and techniques. According to Shields (1997), the potential change drives are competition, operations technologies, information processing technologies and organizational designs. These factors have encouraged new management

accounting techniques or methods such as Activity-Based Costing (ABC) [Shields (1995), Anderson (1995), Anderson and Young (1999)], Strategic Cost Management (SCM) [Shank (1996)], Total Quality Control and Just-in-Time [Kaplan, (1986)] and Transfer Pricing [Boyns *et al.*, (1999)] to be adopted. The drivers of change have also been categorised into the specific classifications of motivators, catalysts and facilitators (Innes and Mitchell, 1990) and these indicate the differing roles which causal factors can have in the process of change. Change in the environment also implies uncertainty and risk which create a demand for further management accounting change in the form of 'non-financial' measures (Vaivio, 1999a).

While change can be studied from the perspectives of its nature and causes it is also relevant to examine the main causes of resistance to management accounting change in organizations. Changes to management accounting might not be accepted and the barriers and hurdles causing this represent resistance to change. Several studies on this aspect have investigated the nature of change resistance and the reasons for it (Foster and Ward, 1994; Scapens and Roberts, 1993; Kaplan, 1986; Burns and Scapens, 2000; Hardy, 1996; Bruns, 1987; Cooper *et al.*, 1992).

Management accounting change research has used a variety of theoretical frameworks and a range of different research methods. The former include the following: the principal-agent relationship (Baiman, 1982; Ronen and Livingstone, 1975; Baiman and Demski, 1980; Namazi, 1985; Mitchell *et al.*, 2000); the market and hierarchies or

transaction cost approach (Williamson, 1979; Ezzamel and Hart, 1987; Johnson, 1983; Flamholtz, 1983; Boyns *et al.*, 1999); the institutional theory context that highlights the rules, routines, and practices of organizational processes (Burns *et al.*, 1999; Burns and Scapens, 2000); and the organizational and social context with a focus on power and knowledge relations (Hopper *et al.*, 1987; Miller and O'Leary, 1987; Walsh and Steward, 1993; Covaleski *et al.*, 1996). The latter include both the case study (Amat *et al.*, 1994; Anderson, 1995; Shank, 1996; Kaplan, 1986; Turney and Anderson, 1989), the field study (Innes and Mitchell, 1990; Ezzamel, 1994) and the survey method which has not been as widely used by researchers in this area (Libby and Waterhouse, 1996; Askarany and Smith, 2000; Williams and Seaman, 2001). Each approach has its strengths and weaknesses. Both approaches are appropriate in different occasions and in answering different questions. As suggested by Yin (1994), the 'what' and 'why' questions are likely to favour survey strategies. Questions relating to 'how' management accounting change processes are less susceptible to questionnaire based research. The case study approach is more appropriate for studies with this focus.

1.2 STUDY DESIGN AND RATIONALE

A survey of the literature on management accounting change (see chapter 2) shows three relatively neglected areas and these provide a focus for this study. First, there is little research which takes accounting of different types of management accounting

change. Second, the relationship between the significance and the success of change in terms of its effective operational integration has been largely ignored. Third, several management accounting studies have identified factors causing management accounting change but have not explored the specific significance of each factor to the organisation's MACS. There is also a lack of explanation of the relationship between the possible causal factors and there is no exact specification of them. Indeed many different terms have been used by researchers for the same or similar factors. Researchers have also limited the range of change factors studied. For example, the changes in management accounting and control systems (MACS) are measured by Libby and Waterhouse (1996) simply by counting the number of changes in a specified time period. The significance and success of these changes is not investigated. Only four potential variables that might influence MACS were used in their study and their integration in a change process was not explained. This study therefore focuses on both the nature of management accounting change and the identification of the factors which cause change in management accounting at the level of the individual firm. It is, in part, based on the replication and extension of the Canadian survey of Libby and Waterhouse (1996). The replication facilitates comparison of the causes of management accounting change in Canada, Malaysia (where this study was conducted) and Singapore [where a prior replication was undertaken by Williams and Seaman (2001)].

The extension adds several refinements to these two earlier studies. All are designed to add to the explanatory power of the prior research. First, this study recognizes that a

practical definition of change in management accounting has been avoided by researchers. To take account of these different categories of change, reflecting variation in nature and relative significance are introduced in this study. Second, the range of external causal factors have been augmented by a number of internal factors suggested in the growing literature on management accounting change. Thus the normal assumptions of change as a uniform or homogeneous phenomenon driven by exogenous variables are modified in this study. Thirdly, this study identifies the main causes of resistance to the management accounting change process. Finally, a case study was also conducted to permit a more detailed examination of the management accounting change process in an organisation. This research method was adopted to compliment the initial-based survey research. This extension thus supplements the empirical explanation of management accounting change process found in the two above-mentioned studies.

The remainder of the thesis is organized as follows. Chapter 2 draws on previous research to identify the different dimensions of change, causal factors (Innes and Mitchell, 1990; Libby and Waterhouse, 1996), change processes and factors that caused management accounting resistance to change in manufacturing organizations. The adoption of both survey and case study research methods (triangulation method) are explained and justified in Chapter 3. The statistical results on the survey-based study conducted on the Malaysian organizations are provided in Chapter 4. The results of the replicated L&W study and comparison with the L&W and W&S studies are presented in Chapter 5. Chapter 6 extends L&W's study include analysis of the five change

dimensions, the significance and success of changes and their causal factors. L&W MACS regression change model was used and extended as the basis for this analysis. This new model was applied to the respondents five MACS, their sub-systems and the different change dimensions. Minho Berhad's (the case study company) management accounting change process is reviewed in Chapter 7. Finally, Chapter 8 presents the conclusions of literature, survey, case study, limitations of each research method and areas for future research.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews the research literature on management accounting change. It provides basis for the design of the research conducted both in terms of research methods used and the aspects of change upon which the study is focused. This chapter is divided into four main sections. The first section covers a discussion on different management accounting change dimensions. The second reviews factors that cause management accounting to change. The different change process perspectives adopted by management accounting change researchers are discussed in the third section. Finally the fourth section demonstrates several factors that cause resistance to change in

management accounting. This is followed by a section that summarizes the significance of the literature review for the subsequent study.

2.2 SECTION ONE

MANAGEMENT ACCOUNTING CHANGE DIMENSIONS

Change is a general term and in respect of most objects, it may therefore address and encompass a variety of dimensions. This is evident from the key aspects of change which are reflected in the definition of Concise Oxford Dictionary, 10th Edition, 1999, p.235. This definition includes all of the following aspects: making or becoming different; becoming new; taking or using another instead; alteration or modification of a new experience; and the substitution of one thing for another. These aspects represent different types of change and this variety demonstrates that change, in general, is not a uniform phenomenon. It can differ significantly in its nature, importance and implications. Due to this variability management accounting researchers can potentially study very different types of change. For example, Anderson and Lanen (1999) examined two aspects of management accounting changes in their study. These were changes as an integral aspect of organizational structure and existing management accounting being used in qualitatively different ways. The variety inherent in change makes it important for researchers to be specific about the type of management accounting change on which their work is focused.

Change involving minor modification of what already exists is unlikely to have the significance which the introduction of a major novel management accounting system component will have. Different types of change have different research implications. The following section illustrates the variety that the term management accounting change may encapsulate. As a topic of research the term must therefore be used with some care as it may be used to denominate events which differ considerably in nature. This section will also examine how researchers, to date, have conceived management accounting change. It reviews how they implicitly or explicitly addressed the issue of management accounting change. From this analysis some conclusions are drawn on the implications of differing change dimensions for researching the topic.

The various dimensions of change can be applied to management accounting in the following ways.

2.2.1 Introduction of new techniques as replacements for existing ones

This relates to situations where a management accounting method is replaced by a new one. For example, where investment appraisal assessment based on the payback period is replaced by the net present value approach. A number of researchers have studied change as the progressive replacement of lots of existing management accounting system. Foster and Ward (1994) considered that management accounting change can be

seen as a radical development in innovation where it involves novel replacement of existing procedures. For example, the implementation of an activity-based costing system or the introduction of a totally new set of performance measures such as the balanced score card could be viewed in this way where they replace traditional techniques. Indeed, Anderson (1995, p.1) adopts this conception of management accounting change,

> An opportunity to study the technical and organisational impact of management accounting system changes has emerged with companies' adoption of activity based costing (ABC)

According to Innes and Mitchell (1990), the shortcomings, inadequacies and declining role for several traditional management accounting techniques do underlie the demand for replacement of many aspects of management accounting system. If these deficiencies are widely recognised and acted upon, then this type of change will be relatively common in practice. Where traditional financial and cost accounting systems do not produce the information that managers require, new cost management systems must be designed and implemented (Miller, 1992).

Other examples of this type of change being researched include: the 'switching' from an incremental budgeting system to a Planning, Programming, Budgeting System (PPBS) (Ezzamel, 1994) by a university; the replacement of one conventional investment technique, Net Present Value (NPV) with a Strategic Cost Management approach in evaluating technology investment opportunities (Shank, 1996); and the introduction of

sophisticated capital budgeting techniques such as discounted cash flow and risk analysis as replacement of the non-discounting techniques (Klamer and Walker, 1984).

2.2.2 Introduction of new techniques where no management accounting previously existed

This involves the extension of the management accounting system by the introduction of new (to the organisation) techniques. For example, the first use of a product costing system or the first implementation of divisional performance reports. It therefore relates to the *initial* development of new management accounting and therefore may often relate to the early stages of organisational development.

Several researchers have viewed management accounting change as a more discrete event by considering it to be the introduction of a new technique or system where none previously existed in the company or organisation. Askarany and Smith (2000) described this as 'newness' which includes recently developed cost and management accounting techniques such as: activity based costing (ABC); activity management (AM); activity based management (ABM); local information system (LS); balance scorecard (BS); life cycle costing (LCC); target costing (TC) and strategic management accounting (SMA). Vamosi (2000) adopted this dimension in a study of the introduction and use of new techniques such as cost estimates for price calculation and cashflow

management in a newly privatised company. The new competitive context of the firm required prompt supplementation of the existing management accounting system. Competitive pressure has been associated with a range of new introductions, for example scientific management (Armstrong, 1985), and similar techniques such as cost-benefit analysis (Edwards and Newell, 1991) and value-for-money (Cobb *et al.*, 1995). This type of novel change can also arise from the introduction of new managerial policies. For example, Innes and Mitchell (1990) found this type of change in their process of management accounting change study. It included the new management accounting supporting policies introduced by the companies for cost reduction, cost control, production location and product quality.

2.2.3 Modification in the management accounting information or outputs

Management accounting change can also incorporate modification in the content or presentation of information or outputs produced as opposed to changes in techniques. This involves using existing management accounting systems but amending the information outputs. For example, the inclusion of more variances in a standard costing report, the re-ordering of information in a performance report or the alteration of presentation of information from numeric to graphical. As noted by Cobb *et al.*, (1995), new features in the presentation could include key performance indicators and ratios

such as return on risk weighted capital. While Vaivio [1999(a), p.409], highlights the need for this change as,

> It has been claimed that financial measurements should be complemented with 'new' non-financial indicators and companies are being advised to erect multidimensional measurement systems

According to him a company adopting a new strategy and concept such as Total Quality Management may also require additional measures. Further, supplementary measurements on productivity and performance can be required to assist in achieving a company's new manufacturing goals, (Kaplan, 1983). These new strategies could be viewed as modifying existing management accounting as they require additional financial and non-financial measures to be included in existing performance reporting systems.

Similarly, in Amat *et al* (1994), adopting new technologies and making strategic changes was found to require more non-financial information for performance measurement and assessment. Non-financial measures were needed as the financial figures were poorly understood by most non-financial managers. This idea of change representing information output variation is supported by the Burns *et al* (1999) survey, which concluded that considerable management accounting change has taken place. However this change is in the way management accounting outputs are used, rather than change in management accounting systems and techniques themselves.

2.2.4 Modification of the technical nature of a management accounting technique or system

Management accounting change can be viewed as the modification of the existing management accounting technique or system. This involves a modification of the techniques representing the existing management accounting system of the organisation. It would include, for example, the alteration of overhead absorption from a labour hours to a machine time basis in an organisation's costing system.

An example in the modification on the manner of overhead allocation was found in Kaplan's (1986) study. Overhead allocations were modified from a 'lump cost' basis of collection and allocation to a process of collection and allocation on a disaggregated basis. In the same pilot study, a modification also occurred in the allocation of costs to activities by changing from a simplistic basis using direct labour hours to a more normalized complex measure of output due to using the more advanced technology. The change of overhead allocation from direct labour to a more suitable method can also be seen in Brimson, (1986). Similar modification of conventional overhead rates to the direct charging of overhead to components or products can also be found in the Innes and Mitchell (1990) study. This has resulted in the development of a cost allocation 'methodology' based on cost drivers. As noted by Cobb *et al* (1995), this cost allocation 'methodology' is to minimise the possibility of arbitration in the cost allocations.

Modification of the existing management accounting system is essential in a dynamic business world. Companies may have to change their organisation structure as a means of enhancing the effectiveness of their budgetary control (Bruns and Waterhouse, 1975) or modify the budgeting setting process (Cobb *et al.*, 1995). Similarly, a company may also need to modify its product costing system. For example, from marginal to total product costing method (Edwards and Newell, 1991) or improving product costing practices (Granlund, 2001).

2.2.5 Removal of a management accounting technique or system with no replacement

Change need not simply involve adding to the management accounting system. Management accounting change can also be reductionist. System reduction is also a possible type of change where the elimination and non-replacement of a management accounting technique occurs. The need for the removal can be linked closely to the nature of the production technology and when the production costs become relatively less significant. An example of this would be the removal of traditional budgeting with no budgetary type replacement. Another example, in one USA study, part of the existing cost accounting systems that were designed to collect data that no longer existed or was no longer used by management were removed to eliminate the cost of

maintaining them. No replacement was made of these obsolete systems (Turney and Anderson, 1989).

2.3 STUDIES WHERE MANAGEMENT ACCOUNTING CHANGE IS GENERALLY DEFINED

Several researchers, have omitted any explicit definition of management accounting change from their research (Libby and Waterhouse, 1996; Williams and Seaman, 2001; Luft, 1997; Oakes and Miranti, 1996; Boyns *et al.*, 1999). Their work is based on changes in the management accounting system within a specific period of time but the designation of such changes are left to the discretion of respondents in their survey. No specification of change is made. The changes could therefore be in any of the above categories and could be of varying levels of significance. Several researchers, however, relate management accounting change to the broader set of routines in every organization and consider that the process of management accounting can be explained through a thorough examination of the organisation's existing rules, routines and institutions. In these studies also change is not specified by type or nature (Burns and Scapens, 2000; Scapens and Roberts, 1993; Vamosi, 2000).

2.4 SECTION TWO

FACTORS THAT CAUSED MANAGEMENT ACCOUNTING CHANGES

In the previous section it was noted that there are different types of management accounting change and this variety demonstrates that change is not a uniform phenomenon. Consequently one might expect the causal factors of change to vary also, and indeed it is confirmed by management accounting researchers that change in practice is due to numerous factors. Examination of these factors shows that they can be organised into two major categories ie: the macro-context factors and the micro-organisational aspects. These correspond respectively to external factors and internal factors. Amat et al., 1994 also used these two categories in their case study of management accounting system (MAS) change.

Besides these two major categories, there are other environmental factors such as economy, political and social contexts (Hopwood, 1983; Oakes and Miranti, 1996 and Amat *et al.*, 1994) which react as the 'overarching factors' to the two major categories. According to Hopwood and Miller (1994, p.1),

> The manner in which accounting has become embedded in so many areas of social and economic life has been a continuing concern

Organisations are reciprocally linked to a multiplicity of interests whereby some interests are located primarily within the organisations, some are located in the

environment within which the organisations operate and some straddle in between organisations and the environments. Hopwood and Miller (1994) suggested that accounting research should move beyond the boundaries of organisations and be concerned with the notion of social, economic and political consequences. The different categories of causal factor are explained in more detail below.

2.4.1 Environmental factors

Economy, Political and Social Contexts

The 'overarching' environmental factors are the economic, political and social dimensions in which an organisation operates. The influence of the significant changes in these operating environments do put tremendous pressures on accounting to change (Granlund, 2001; Haldma and Laats, 2002). They are defined as follows in the Oxford Advanced Learner's Dictionary, 4th Edition:

Economy (p. 384) as,

> Operation and management of a country's money supply, trade and industry; economic system

Political (p. 958) as,

> Of the State; of government; of public affairs in general; political rights; liberties, etc"

Social (p. 1213) as,

> Concerning the organization of and relations between people and communities'

Due to the inter-relationship of these three common factors, Amat *et al.*, 1994 and Oakes and Miranti (1996) have capsulated them into one heading in their respective studies on Management Accounting System (MAS) and standard costing. Several other researchers have also adopted the combination of these environmental factors in their studies.

These three factors create key aspects of the organisational environment which may be unstable or turbulent (Klamer and Walker, 1984). They therefore create varying levels of uncertainty for an organisation and this is likely to impinge on internal information demand. Prior researchers have related this uncertainty to several combinations of several aspects. As stated by Edwards and Newell (1991, p. 53) in a study on the development of industrial cost and management accounting before 1850,

> Accounting has developed to serve management in an increasingly complex and constantly changing social and economic environment

Thus, a variety of costing procedures is employed by organisations to suit the differing circumstances and information required. The social and political turbulence at certain points of time does contribute to the development of new management accounting techniques or methods (HassabElnaby *et al.*, 2003; Laitinen, 2003). For example, the study by Oakes and Miranti (1996) shows that the social and political crisis of the 'progressive period' contributed to the prominence of scientific management and standard costing. The techniques of scientific management seem to appear because of the problems which they solved. Similarly, changes in the strategies are related to the economic crises and this inter-link is supported by the study conducted by Armstrong (1985).

2.4.2 Macro-context and micro-organisational factors

Analysis of studies on management accounting change also reveals that several factors exist in each of the two major categories. Thus further sub-division outlines the possible drivers of changes. These are listed as follows:

1. Macro-context factors and the three (3) sub-groups;

a) Competition

b) Market

c) Consumers

2. Micro-organisation and the seven (7) sub-groups;

a) Organizational structure

b) Managerial policies

c) Cost structure

d) Production technology

e) Problems of existing techniques

f) Employees

g) Deterioration of financial performance

This section examines the underlying factors that initiate management accounting change which researchers have found. Therefore, the mere process orientated factors which can influence the ease of change and its success are excluded at this stage but will be examined in the next section. The following sub-sections will explain the nature of the two main categories and their respective sub-groups.

2.4.3 Macro-context factors

The macro-context factors are external factors i.e. they exist outside the organization. In other words, macro-context factors are the environmental factors that the organisation experiences at any given point in time. Environmental factors are important in explaining the different accounting information adopted. Khandwalla (1972)

encompasses competition such as price, marketing or product competition as an environmental factors. The main contributor to these environmental factors is the consumer. Consumers play major roles in determining the environment that the organisation is in. As stated by Gordon and Miller (1976), the environment of an organisation can be characterized by at least three key dimensions: dynamism, heterogeneity and hostility and each depends on the consumers' 'tastes'. Thus competition, the consumer and the market situation are all relevant external factors influencing management accounting change. Each of these three components are considered in more detail below.

Competition

According to the Encyclopedic Dictionary of Managerial Economics, p. 35, competition is defined as,

> a process of rivalry where the firms try to gain an advantage through pricing decisions, advertising, research and development, product quality and other means

This can be broadened to include several other factors by examining a range of contemporary definitions. Khandwalla (1977) defined competition as the perceived intensity of competition faced by an organisation which consists of: competition for raw material, technical personnel, selling and distribution quality and variety of products and price. In addition, several researchers have included other aspects and dimensions

when explaining competition. These include aspects such as quality and cost minimization and productivity which require the introduction of a new accounting control system into an organisation (Kaplan, 1983). And it is further claimed by Kaplan (1986) that existing cost accounting systems are unlikely to provide useful information for manufacturing operations and change is therefore needed as the competitive pressure increases. The dimension of competitive pressure mentioned by Kaplan covers quality, performance and price.

The competitor dimension also covers aspects such as globalization (bigger market-place against more competitors) and lowest technology costs [Shields (1997) and Cobb *et al.*, 1995]. The changes in these aspects lead to changes in the management accounting systems (MAS) and particularly to an organisation's management accounting reports. Similarly, Brimson (1986) and Miller (1992) argued that with rapid increase of competition from abroad, today's cost management systems are failing to provide organisations with financial information they need to manage their factories. Better management information is needed due to increasing international competitive pressures (Burns and Scapens, 2000).

Further, the uncertainty in the competitor's environment is one of the possibilities for an organisation to 'follow-the-leader' in using sophisticated capital budgeting techniques in their capital investment decisions (Klammer and Walker, 1984). As cited by

Armstrong (1985), the 'intra-organisational' relationships (e.g. supply chain) will also influence the development of control strategies and cause changes to previous systems.

Market

The market comprises a key component of the circumstances in which a firm operates. Its nature influences a firm's behaviour as economic success depends on exploiting the market. Market nature and conditions are themselves subjects for information provision (i.e: strategic management accounting) and also contribute to the uncertainty which creates information demand within firms.

The market is defined by Encyclopedic Dictionary of Managerial Economics, p. 118 as,

> the group of all firms that are willing and able to sell a similar product or service to the same potential buyers

From the above perspective, the market is defined by the dependence and relationship of an organisation with the others (Burns and Waterhouse, 1975). However, market and competition to some extent are exchangeable and several researchers therefore, have combined both environmental factors in their studies. For example, Turney and Anderson (1989) have included marketing excellence through improved quality, delivery, flexibility and designs as the competitive benefits in the marketplace. These

demand an organisation's management accounting system to be proactive in the search for continuous improvement. Similarly, the competitive and dynamic market environment requires costing practices which involve: simplification of cost accounting systems, performance measurement (Innes and Mitchell, 1990); price calculation and cash management (Vamosi, 2000) and better management information (Burns and Scapens, 2000).

Despite the increase in the market and competition, Burns *et al* (1999) argued that management accounting processes have been slow to change but *how* management accounting is used has changed a lot in recent years.

Consumers

The consumer is another fundamental environmental factor which can promote internal organisational change. Customer demands vary and this can have repercussions for many aspects of organisational life. The importance of the customer to any organisation can be seen from the definition by Encyclopedic Dictionary of Organizational Behaviour, p. 169 as,

> customers are also vital stakeholders. They expect a company's products to meet their expectations of quality, service and reliability. Excellent companies show their commitment to

> fulfilling customer demands by initiating and enforcing internal practices that improve product quality and customer service

The impact of the customer on internal accounting is felt in several ways. For example, introduction of many new products and innovative practices such as financial futures options, derivative products, currency swaps market by banks to customers have created a tremendous pressure for change throughout the banking community. Several management accounting changes include new features of reports with key performance indicators, identifying cost drivers to avoid arbitrary allocation, value-for-money (VFM) exercise and activity-based-costing (ABC) implementation (Cobb *et al.*, 1995).

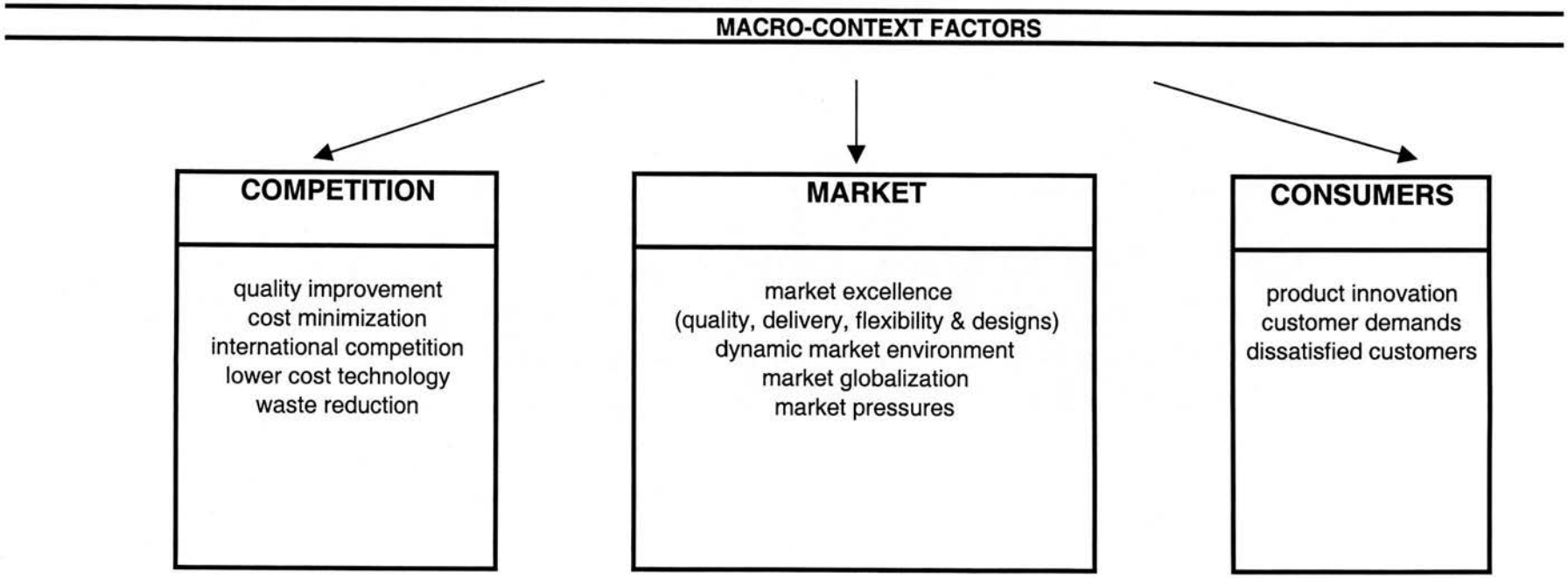
Consumers can be a 'core' issue to any organisation and devoting attention to them could lead to the introduction of non-financial performance measures which reflect customer-firm relationships. For example, Total Quality introduction requires non-financial measures to be part of the management accounting report. Many of the non-financial measures are introduced with the intention of minimising customer dissatisfaction [(Vaivio, 1999(a)]. Another study by Vaivio [1999(b)] suggests firm transform the customer into quantitative knowledge and i.e. 'The Quantified Customers'. These calculable spaces like 'The Quantified Customer' will change conventional management accounting. The consequent 'new' management accounting developments are beyond the constraints of financial analysis but will bring them much closer to the complexities of everyday management. As cited by Vaivio [1999(b), p. 710],

> Management accounting becomes a more active management craft, addressing directly what is deems urgent

Similarly, Foster *et al*'s (1996) study shows there is growing recognition that customer account profitability (CAP) represents an important future direction of management accounting. The main emphasis of CAP is to attract and retain profitable customers. Given the importance of customer bases, management accountants should track the change of customer's 'performance' periodically.

Figure 1 shows the three sub-groups of macro-context factors listed above and the related factors that fall under each respective headings.

FIGURE 1


MACRO-CONTEXT FACTORS
COMPETITION
quality improvement
cost minimization
international competition
lower cost technology
waste reduction
MARKET
market excellence
(quality, delivery, flexibility & designs)
dynamic market environment
market globalization
market pressures
CONSUMERS
product innovation
customer demands
dissatisfied customers

2.4.4 Micro-organisational factors

The micro-organisational factors causing management accounting change exist within the organization. A review of prior research shows that they can be grouped under the following seven headings.

Organisational structure

According to Otley (1980) accounting systems will depend upon specific circumstances which the organization is in. This contingency approach identifies one of the specific circumstances as organizational structure and its contributions to management accounting change in several ways. Innes and Mitchell (1990) have adopted the organizational structure as one of the specific circumstances in their study on the process of change in management accounting. The study has identified three sets of factors namely motivators, facilitators and catalysts which are involved in the process of change in management accounting, for example, the level of decentralization was found to be an important factor facilitating accounting change.

Several other researchers have explicitly or implicitly identified the link between organizational structure and other management accounting dimensions. These include the study by Bruns and Waterhouse (1975) that explores the interaction and relationship of organization structure and budgets. The study concluded that the relationship

between organization context, organization structure and budget-related behaviour are consistent with the view that organization control strategies may be dichotomized into two general categories, decentralized but structured and centralized. Therefore, choice or change in organizational structure might be a means of change in the organizational budgetary control system. However, this finding is inconsistent with the Libby and Waterhouse (1996) analysis which shows no significant relationship between the number of management accounting control systems (MACS) and decentralization. As suggested by Shield (1997) in addition to the decentralized of organizational design there are a number of other designs such as: horizontal, flat, self-directed multi-functional teams, joint ventures, networks, etc. which lead to potentially relevant changes in the organizational context of management accounting. Burns *et al.*, 1999 further suggest different dynamic aspects of organizational design which include downsizing, outsourcing, delayering and teamworking and these can all have an impact on management accounting.

The development of an organization from a family-run small business to a professionally managed medium-sized business with expanding organization structure also requires the implementation and change of management accounting systems (MAS) (Amat *et al.*, 1994). Similarly change in the management structure from a government-owned company to 'market economy', management accounting and reporting has changed from formal, hierarchical decisions to adapting to a new market and everyday reality (Vamosi, 2000). Ezzamel (1994) supports this view that expanding

organizational structure might change the management accounting and has exemplified this in the study of a university's budgeting system. There is also a need for an organization to adopt new management accounting techniques or methods to support corporate growth and which alter the organization structure (Anderson, 1995).

Managerial policies

The above paragraphs have demonstrated the change in management accounting as a result of organizational expansion and change in the structure. However this is 'incomplete' without relating it to organizational activities. Edwards and Newell (1991) showed that cost accounting systems have been designed and used since 1850 by organizations pursuing policies of financial improvement on their various processes and activities. Organizations require relevant information for the organisation to plan, manage, control and direct the activities of the business in order to implement managerial policies to improve processes and products, eliminate waste and execute business operations and strategies (Miller, 1992).

Cost structure

Manufacturers worldwide now find themselves at the crossroads. In order to compete effectively, companies must simultaneously strive to manufacture sophisticated products at an exceptionally low cost while maintaining high quality with outstanding

customer service. According to Brimson (1986) manufacturing factors of production are shifting in nature from variable to fixed. An example is the decreasing direct labour component. As a result of these changes in manufacturing methods, there is an increasing need for companies to continually reevaluate their basis of overhead allocation for example, from direct labour to machine hours. Failure to change allocation techniques is a major problem for manufacturers. However, changing the allocation base does nothing to change the trend from direct to indirect costs. Nowadays manufacturers face an increasing pool of indirect costs and a decreasing pool of direct costs. Activity-based costing (ABC) is a technique introduced as a reaction to the growth of these indirect costs (Anderson, 1995; Innes and Mitchell, 1995; Anderson, 1999; Cotton *et al.*, 2003).

However, Innes and Mitchell's (1990) study indicated that in the small number of electronics firms studied, direct material was the most significant cost. Accordingly this pattern of costs has contributed to the abandonment of traditional costing systems which tracked products and attached costs throughout the manufacturing process. Companies often combined labour and overheads in one rate and because of the importance of direct material cost, focused on material resource planning (MRP) and material stock-reporting. This cost-consciousness has not only been a recent concern. The development of industrial cost and management accounting before 1850 in Edward and Newell's (1991) study shows that the changes in the companies' cost structures had altered the

purpose of management accounting from a concern with the identification and accumulation of cost to a support for planning, decision making and control.

Production technology

As stated by Nanni *et al* (1992, p. 4),

> Manufacturers must have the response capability to take advantage of technological changes through process and product innovation. The environment in which management accounting operates has changed significantly in the last twenty years and obviously this change has been in the technology and the complexity of manufacturing operation.

The adoption of new and high technological manufacturing techniques which shift production from normal to machine or computerized can have repercussions for management accounting. Hence, improved measures of quality, inventory performance, productivity, flexibility and innovation are required (Kaplan, 1983).

The products produced in a high technological organization are basically more complex and have a short life cycle (Brimson, 1986). Traditionally, the product life cycle includes four stages: start-up; growth; maturity; and decline, and spend most of their lives in the last two stages. High tech products, by contrast, spend comparatively little time in that domain. According to Litrell (1984), the change in the product life cycle has two notable effects on management accounting. The relevant range of activity, one of the keys to effective cost-volume-profit (CVP) analysis keeps changing and rapidly

growing production capacity will affect the operation of fixed overhead rates. It is also difficult for management accountants to put together all the data necessary for setting cost standards and without these detailed variances reporting is precluded.

A shorter product life-cycle and the desire to remain competitive requires high tech organizations to invest in new manufacturing technologies such as: computer integrated manufacturing (CIM); flexible manufacturing systems (FMS); advanced manufacturing technology (AMT); etc. New capital investment analysis is therefore needed. Shank (1996) suggests the conventional methods of capital investment analysis should be replaced by strategic cost management (SCM) as this approach takes into consideration crucial strategic issues.

Innes and Mitchell's (1990) study indicated that production technology influences management accounting in three areas. The increase in production automation will lead to the development of machine and equipment performance measures through identifying 'cost drivers'. The short production cycle and growth will initiate delayed costing and replacing overhead rates by direct charging. Finally, the importance of maintaining quality standards will influence the development of quality cost information.

Problems of existing techniques

Inadequacy of existing management accounting methods is closely linked to the introduction of new techniques. The existing approaches or techniques may not be adequate for this current organisation's operations (Armstrong, 1985). There could be shortcomings in the traditional approaches as the role of the traditional industries declines (Lapsley and Mitchell, 1994) and shortcomings could also possibly be due to the lack of reliability of traditional costing (Askarany and Smith, 2000). For example, products are changing rapidly with shorter product life cycles in a high tech environment. Traditional cost accounting systems which are based on an assumption of long production runs of a standard product, with unchanging characteristics and specifications, will lack relevance in this new environment.

High technology production has changed cost structure with more emphasis on indirect as opposed to direct cost. This has resulted in organizations adopting more appropriate techniques for controlling overheads. The motivation for ABC derives from a need to adjust inequities in traditional volume-based allocation techniques for these indirect manufacturing costs. ABC design is such that various production support activities that are similar should be classified together. The cost of these activities are then pooled to form an activity cost pool and a single activity driver is used for each of them in costing products (Anderson, 1995; Anderson and Young, 1999; Shields, 1995; and Cobb *et al.*, 1995).

Due to shorter product life cycles in high technology environments, organizations are also faced with frequent capital investment decisions. However, traditional capital investment appraisal techniques are not without their limitations. Shank (1996) argued that the conventional methods of capital investment analysis do not capture the full impact of the technology-change decision. For example, the net present value (NPV) places such a premium on short-term financial results and little emphasis on difficult-to-quantify issues such as quality enhancement or manufacturing flexibility. The study suggests high tech organizations adopt strategic cost management (SCM) as this approach evaluates strategic issues in its capital investment appraisal.

Employees

Another important factor that can contribute to management accounting change is the organisation's employees. As Granlund (2001, p.162) suggests, the human factor should always be carefully considered in accounting system development projects. People change accounting and in this sense employees cause all management accounting changes. However, they may also be an initiating force in change and not simply a means by which it occurs. According to Klamer and Walker (1984) most employees have been exposed to new techniques and methods through their previous education, attending presentations, seminars or reading published articles. These contacts provide sources of new ideas to apply in their current organization. Change may also originate from employing new experienced accounting staff (Armstrong, 1985 and Lapsley and

Mitchell, 1994) or exposing them to the international manufacturing processes and information systems (Edwards and Newell, 1991).

There may also be a need for the organisation to change part of its management accounting system to suit the internal power struggle between the capital providers and the employees. Normally, this would involve the organisation's reward systems (Ezzamel, 1994; Oakes and Miranti, 1996; Boyns *et al.*, 1999, Amat *et al.*, 1994 and Foster and Ward, 1994) which in turn is heavily dependent on performance measurement information.

Deterioration of financial performance

A deterioration in financial performance itself creates pressures for action to be taken which will improve performance and finances. However the success of remedial action depends upon whether or not it addresses the problems and issues giving rise to the initial deterioration. Thus as a reaction to poorer performance there may well be an increased demand for information to help ascertain causes, guide action and strengthen controls. It is likely that, in some measure, the solution to this information demand will fall to the management accounting function to provide. Thus a dip in performance can lead to changes in the management accounting system.

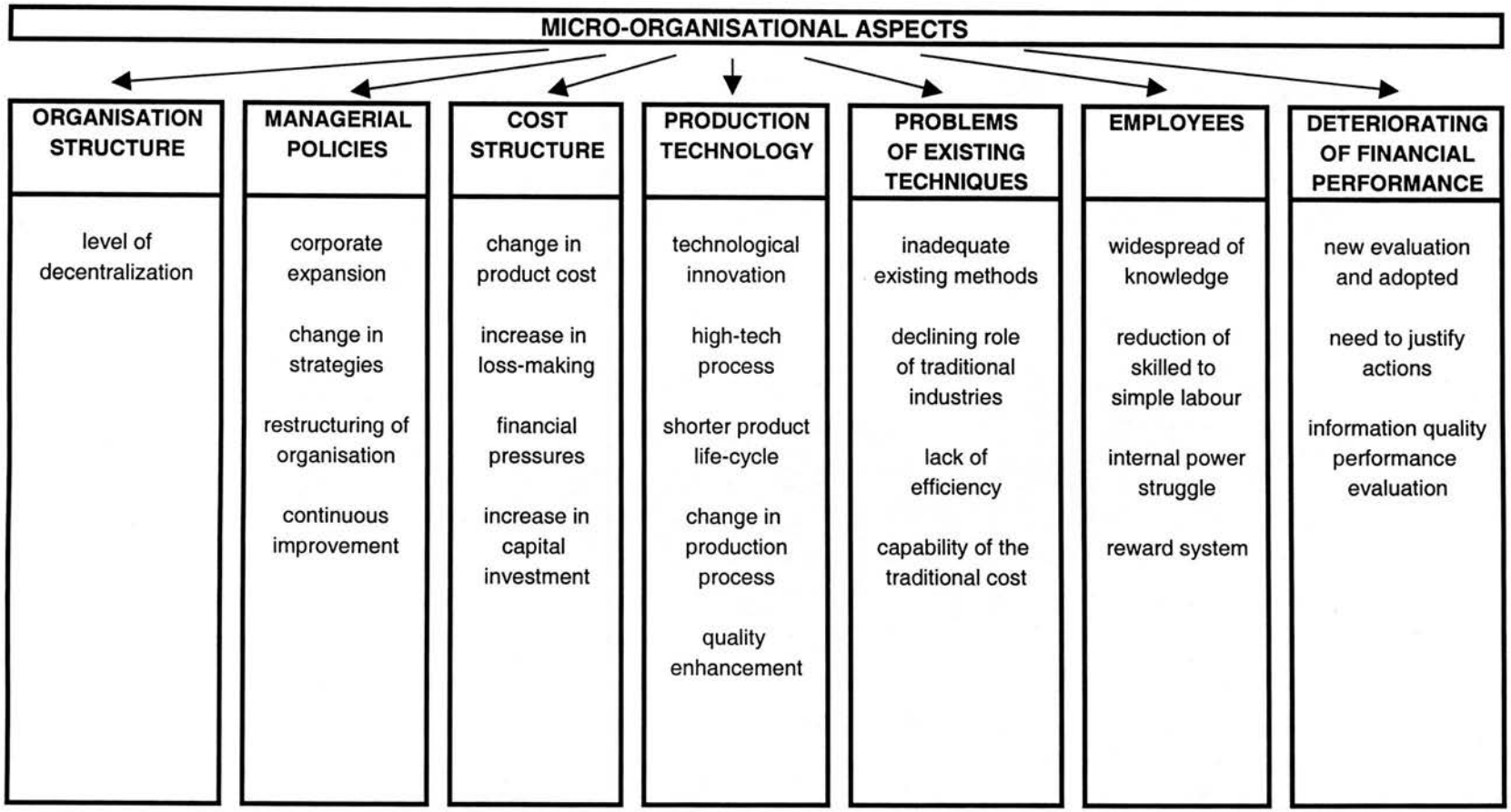
Innes and Mitchell (1990) found a deterioration in financial performance to be a catalyst which triggered new developments in management accounting in the turbulent world of high-tech companies. Their finding was confirmed by Haldma and Laats (2002, p. 396) who observed in a more general study that,

> ...dissatisfaction with the performance measurement system, which was unable to provide appropriate information for decision-making, served as a significant catalyst in improving the cost accounting and MAS

The acquisition of a stock exchange listing may enhance these effects as listed companies come under short-run pressure to maintain an improving trend in financial performance or see their share price decline and possible their independence lost (HassabElnaby *et al.*, 2003).

Figure 2 shows the seven sub-groups of micro-organisational factors listed and the related factors that fall under each respective headings.

FIGURE 2


MICRO-ORGANISATIONAL ASPECTS
ORGANISATION STRUCTURE
level of decentralization
MANAGERIAL POLICIES
corporate expansion
change in strategies
restructuring of organisation
continuous improvement
COST STRUCTURE
change in product cost
increase in loss-making
financial pressures
increase in capital investment
PRODUCTION TECHNOLOGY
technological innovation
high-tech process
shorter product life-cycle
change in production process
quality enhancement
PROBLEMS OF EXISTING TECHNIQUES
inadequate existing methods
declining role of traditional industries
lack of efficiency
capability of the traditional cost
EMPLOYEES
widespread of knowledge
reduction of skilled to simple labour
internal power struggle
reward system
DETERIORATING OF FINANCIAL PERFORMANCE
new evaluation and adopted
need to justify actions
information quality performance evaluation

2.5 SECTION THREE

THE PROCESS OF MANAGEMENT ACCOUNTING CHANGE

The previous section has outlined and categorised the numerous factors that researchers have identified as causes of management accounting change. This section explores *how* these factors cause change. Inevitably because change has to be effected by people the process is a behavioural one, but one which can be viewed from a variety of perspectives. This is achieved by viewing these factors as components of a process by which change is effected. Most researchers have focused on management accounting change as an outcome. Rather less research has been directed to why and how an organization's management accounting becomes what it is, or is not, over time. In other words, as Burns and Scapens (2000, p.4) observe less attention has been given by researchers to viewing management accounting change as a process.

> Little research attention has been given to understanding the processes through which new management accounting systems and practices have emerged (or failed to merge) through time

Adopting a process view provides a basis for a more complete explanation of accounting change as it has facilitated the application of a variety of theoretical frameworks to this end. These are contingency theory, economic theories (agency, market and hierarchies, institutional perspectives, labour process and philosophical (e.g. Foucauldian).

The following sub-sections summarise the process of management accounting change from each of the above perspectives.

2.5.1 Contingency Theory

Many researchers have adopted a contingency approach in empirical studies aimed at explaining the differences found in management accounting in the real world (Chenhall, 2003). The contingency approach seems to be based on the assumption that there is no universally appropriate accounting system which applies equally to all organisations in all situations. As noted by Otley (1980), p.416,

> This movement towards a contingency approach occurred during the 1970s due to partly, to explain otherwise contradictory observations and partly because of the influence of the prior development of the contingency theory of organisations

Contingency theory is based on the premise that the specific scenario of the organisation will determine directly and/or indirectly the accounting system design. Thus a contingency theory is based on an identification of the specific features of an accounting system which can be related to certain organisational circumstances which have caused or influenced them. The contingencies are determinants of management accounting and are therefore likely to be influential in management accounting change.

Contingency formulations were first developed in the organisation theory literature in the early to mid-1960s. One source of their formulation was the lack of conformity found in accounting systems. Contingency theory represents a search for the cause of the differences observed. A significant range of contingent variables have been confirmed in the Bruns and Waterhouse (1975) and Jones [1985(b)] studies in explaining inter and intra firm management accounting differences. The variables influencing the management accounting system comprise a set of contingent variables including, for example, the firm's environment, technology and organisational structure. As stated by Waterhouse and Tiessen (1978, p. 66),

> Contingency theory essentially states that efficient organisation structures vary with organisational contextual factors such as technology and environment. It further implies that the efficacy of certain managerial techniques such as participative decision making or task directed leadership is contingent on the organisation's context and structure. Thus the contingency theory literature provides a convenient point-of-departure for discussing the effects of organisational variables on MAS

Thus contingency variables contribute to an identification of some factors which may drive management accounting change. It attempts to explain why management accounting exists in a particular form within a firm at a specific point of time. In other words it provides only a static management accounting system comparative analysis. However, contingent theory does not explain *how* management accounting system

arrived at its given state or moved from one state to the other (Innes and Mitchell, 1990, p.4).

Th following section briefly reviews the common contingencies such as technology, organisation structure and environment that have been found to be relevant to many accounting system's design.

Technology

This contingent variable emerged from Woodward's (1965) management accounting study on different production technology. Aspects of management accounting seemed to vary according to the different types of production technology: unit production; small batch; large batch; mass production and process production. For example, the measure of production in job-order costing was well-defined and only limited allocation and averaging was required as a large proportion of total costs could be directly associated with particular jobs. However, extensive allocation and averaging were needed in the process costing situation as the bulk of total costs were incurred jointly by a mix of final products. The level of detail and accuracy that is possible in costing unit and small batch production could not be achieved in process production.

Similarly the relationship between technology and the organisational structure in various forms of organisation such as agricultural work, hunting, fishing, collection, construction, manufacturing and stock-rising cannot be ignored (Udy, 1964). An allowance is therefore required for cultural differences in designing each of the organisation structure. Thus technology has an important effect on the type of cost accounting information system design and the organisational structure.

Organisational structure

Structure refers to the internal patterns of an organisation that explain to what extent the activities are specialised, standardised and formalised. For example, when the environment of the organisation is uncertain or its technology is not routine, procedures become difficult if not impossible at the extreme to specify and document. In this type of situation, a decentralised organisational structure is usually appropriate. Knowledge and application of procedures lies primarily with individuals whose training and/or local experience provides them with the ability to solve managerial or operational problems. Under these conditions, procedures tend not to be documented, formalised and standardised. In contrast a centralised organisational structure is more likely to be adopted when the task technology is known and relatively stable over time. In this situation the procedure specification for operating functions can be accomplished and the managerial level procedures can be specified more readily. Waterhouse and Tiessen

(1978) suggested that the nature of organisational control is dependent on the type of organisational structure in force. As suggested by Otley (1978), different budgeting information is used to evaluate managerial performance in a tough and liberal operating situation. Burns and Stalker (1961) referred to these external conditions as 'organic' and 'mechanic', respectively. The implication is that management accounting systems will need to de designed to meet the specific control requirements of specific organisational structure. In a decentralised and structured organisation, legitimate activities are clearly defined, areas of responsibility are clearly delineated and control is essentially impersonal. However in a centralised organisation, control of decisions is reserved to a small group at the top of an organisation (Bruns and Waterhouse, 1975, p. 179).

Environment

Environmental factors are also important in themselves in explaining the different types of management accounting adopted. Sophistication of accounting and control can be influenced by the intensity of the competition it faces (Khandwalla, 1972). Effectiveness of different types of sub-units: production; marketing and research and development are also explained by their environmental relationships and the internal factors. Internal factors include the nature of the tasks performed, type of people, interpersonal relationships and the ability to measure and quantify functions (Thompson, 1967). As suggested by Lawrence and Lorsch (1967), there can be no one

best way of organising a business and thus organisations must vary to be successful under different task and environmental conditions.

2.5.2 Contingency theory and management accounting change

The remainder of this section relates to work by researchers who have adopted the contingency theory in their *management accounting change* studies. As cited by Innes and Mitchell (1990, p.3),

> Some insights into the forces underlying management accounting change are however apparent from a contingency theory perspective of management accounting. Contingency theory provides an explanation of why management accounting systems may differ...

Contingency theory suggests management accounting change is influenced by a set of contingent variables which include, for example, environment, technology, organisation structure and size. Given the many dimensions of management accounting change, novel studies are required to develop knowledge of the ways in which management accounting and contingent variables interact. A recent study has considered the contribution made by contingency research to management accounting over the past 20 years (Chenhall, 2003). This study suggests that to maintain the relevance of management control system contingency-based research, researchers will need to focus

their attention on the contemporary dimensions of management accounting systems, their context and organisational and social outcomes.

Innes and Mitchell (1990) developed an inductive theory and three sets of factors: motivators; facilitators and catalysts involved in the process of change in management accounting. Factors that influence the observed changes in a general manner are termed as motivators and conditions conducive to management accounting change which are necessary but not sufficient are terms as facilitators, while factors that are directly associated with changes, with their occurrence corresponding closely to the timing of the change, are termed as catalysts. Many contingent variables (e.g. market, competition, technology and organisation structure) were among these drivers of change.

These influential factors can also be broadly classified into environmental influences and internal variables. Environmental influences include factors such as competition and technology, while internal variables comprise a variety of factors which include: the organisation size and goals; the degree of structural differentiation; management philosophy; the prevailing culture and the choice by the dominant coalition. There is a need for organisations to modify their management accounting system (MAS) with due regard to such influential factor changes to become or remain competitive [Jones, 1985 (a); Jones, 1985 (b)].

Fisher (1995) argued that many studies on management control examine only one contingent factor and one control attribute at a time. Understanding the interactions between multiple contingent and control factors may be essential in determining the effectiveness of control system design. This view is supported by Otley (1999, p.367) as,

> The contingency theory of management accounting suggests that there is no universally applicable system of management control but that the choice of appropriate control techniques will depend upon the circumstances surrounding a specific organisation ... No specific contingent formulation is necessary to anticipate that the existence of different goals is likely to involve the selection of different performance measures and controls.

Several classes of contingent variables may be relevant to management control systems in complex organisations. According to Libby and Waterhouse (1996) and Williams and Seaman (2001), different components and variables change at different rates. Management accounting and control system (MACS) support in a decision-making and control change more frequently than those that support planning, directing or product costing.

Hartmann and Moers' (1999) study on the contingency literature over the last two decades was on the behavioural and organisational factors that affect budgeting. Moderated Regression Analysis (MRA) was used to test contingency hypotheses that predict interaction effects between budgetary and contextual variables. Their analysis indicated that the use and interpretation of MRA often do not conform to proper methodology and theory. It provides clear evidence that the use of statistics in the

budgetary contingency literature does not indicate a high level of technical quality. It is therefore suggested that more consciously matched theories, hypotheses and tests are necessary ingredients to develop a 'true' contingency theory of management accounting (Chapman, 1997).

Contingency theory suggests there is no universally 'best' design for a management accounting information system. Situational factors appear to determine what is considered most appropriate (Haldma and Laats, 2002). For example, a more appropriate style of budget use depends upon the degree of independence that exists between the responsibility centres. The different nature of production processes: unit production; small batch; large batch; mass production; process production also determine the cost allocation and type of cost accounting information system design. If, as contingency theory suggests, there is a causal relationship between contingencies such as these and management accounting practice then as contingencies change so too will management accounting.

2.5.3 Economic theories

Neo-classical 'theory of firm' studies the aggregate behaviour of firms at a market level. In this traditional neo-classical theory it is assumed that the individuals in the

organisations react instantaneously to environmental changes by trying to make optimal decisions. As noted by Reid (1987, p. 172),

> In traditional neo-classical analysis the firm has been assumed to be unitary in form, with shareholders and managers being unanimous in their desire to maximize profits

The theory assumes that there is economic 'natural selection' of efficient production alternatives or alternative organisational forms. The selection is taken care of by the market, which serves as the 'selection machine'. The firms are considered to be technological production functions, which are squeezed in between markets. The main concern is prices and output. Economists offer a simple yet powerful paradigm for guiding the price-output decisions of firms. The firm profits are maximized at the price-output combination where marginal revenue equals marginal cost. Despite this model, economists rarely notice that firms do not attempt to set marginal revenue equal to marginal cost because economists rarely attempt to observe the behaviour of individual firms (Kaplan, 1982). Economists are more concerned with the aggregate behaviour in the markets and not the actions of individual economic entities. Little attempt has been made to look inside the 'black box' which microeconomic theorists call 'the firm'.

The more recent organisational economics (termed as new-institutional economics), though rooted in neo-classical economics does not perceive organisations as production functions. The organisations are treated as a nexus of contractual arrangements or as a governance structure. These emerging branches of organisational economics view intra-

firm relations as a mere continuation of market relations. Agency cost approach and the market and hierarchies are the new branches that fall in the new-institutional economics. The next section will explain each of those theories and their relation to the management accounting system (MAS).

Agency theory: Principal-agent relationship

The concept of agency is based on contractual relationships between parties. The relationship is in a principal-agent relationship form; a firm and a supplier; a manufacturer and a salesman; a shareholder and a manager; a consumer and a supplier; and in a larger organisation it can be the superior and subordinate relationships. An agency relationship exists whenever one party (the principal) hires another party (the agent) to perform some service. Hence this service rendered requires the principal to delegate some decision-making authority to the agent. For example, the firm's owners or shareholders acting as the principal, hire the manager to be their agent in managing the firm in their best interest. The rights and responsibilities of the members of the firm are specified in the firm's mutually agreed upon employment contracts.

Agency theory assumes that all individuals (whether principals or agents) are motivated by self-interest i.e. by the pursuit utility. In practice this means owners are interested solely in the expected monetary return that will be generated from their investment while managers value both their remuneration and leisure in the firm. Kaplan (1982)

defined leisure as the opposite of effort that increases the expected return to the firm. Agents can pursue their own aims where they are not fully supervised and have some measure of independence in the way they go about their activities. This will be an opportunity cost to the principal.

Given the inability of principals to effect detailed supervision of the agents there is an incentive for agents to avoid risk and to shirk effort (Reid, 1987). In general, the agents' input relates to the amount of effort and the quality of effort or skill they posses. Withholding their effort is called shirking. Principals must also be concerned not only with shirking but also with their agents' skill. The difficulty of selecting managers with the appropriate skills for a required task is called the adverse selection problem. Adverse selection could result in the principals hiring people who are not qualified for the position.

Problems in principal-agent relationship

Sometimes lack of agent supervision is due to the organisation's situation. For example, in a larger organisation which has a decentralized organisation structure. These large and complex organisations may pose more serious agency problems (Ezzamel and Hart, 1987). In these organisations knowledge relevant to decision-making is widely diffused amongst many agents as the subordinates or agents are typically better 'informed' about

the production or the marketing environment than their principals. Information difference or information asymmetry between these two parties prevails. This is the outcome of differences in skill and specialization between the agents and principals. Further the limited ability of the principals to monitor the amount and quality of the agents' input is partly due to inevitable information asymmetry.

Another problem that could arise in the principal-agent relationship is that of moral hazard. This results from the principals hiring the agents to perform certain duties but not being able to motivate them appropriately to perform those duties. For example, an agent is hired only to provide inputs on the organisation's sales. The agent may have individually held knowledge of the market trends, competitor prices etc which are relevant to the task. However he/she may not exploit this knowledge fully i.e. he/she is reluctant to supply the input. Agents' reluctance to disclose their specialized local information is called information impactedness. 'Keeping' the information will probably give the agent more opportunity to shirk and therefore intensify the moral hazard user.

2.5.4 Management accounting in principal-agent relationship

Agency theory shows why there is a demand for management accounting systems to be adopted and changed or developed by organisations. Baiman (1982) initiated a study on

the agency theory and management accounting. One of the objectives of this study was to see what guidelines and insight the agency model could offer to the managerial accountant. Several management accounting concepts are suggested in the study. Agency theory is used to justify such traditional managerial accounting practices as budgeting, cost allocations, variance investigations and performance evaluations. These all help the principal to monitor and control the agent. For example, agency theory can give the management accountant useful insights into the implications of the choice and design of any performance evaluation which may suit certain organisation's principal-agent relationship.

Budgeting serves three decision-making functions: planning; control and motivation. According to Ronen and Livingstone (1975) these functions are developed from the superior-subordinate budget relationship. Budget aids planning in that it incorporates forecasts which reflect the anticipated consequences. Control function is typically a feedback process whereby information about past performance (both anticipated and actual) is provided to those who 'control'. As a motivational tool, the budget conveys information to the subordinate (agents) about expectations of superiors (principal) regarding successful performance and any contingencies. The 'expectancy theory' was developed from this psychology of motivation. This theory assumes that an individual is motivated if he believes that there is a positive correlation effort and performance; the favourable performance will result in a desired reward; the reward will satisfy an important need and the need is strong enough to make the effort worthwhile.

Another element constituted in budget constructions is the setting of standard costs which are used for evaluating performance. Traditionally, standard cost variance analysis procedures were examined as a motivational device in a principal-agent model (Baiman and Demski, 1980). The use of variances in an agent's evaluation may be valuable in order to reward him on the basis of outcomes for which he is responsible. Besides motivating the agent, variances may also provide useful additional information to management accountants and management for any investigations.

Christensen (1982) found that the principal could be better off acquiring information held by the agent. The study thus shows that an agent participation in budgeting can be valuable from an economic point of view if the participation has the effort transferring information from a better-informed agent to a less-informed principal.

Agency theory can also be a useful theoretical guide for managerial accountants to select a particular information system. Namazi's (1985) study on agent-principal contractual relations shows that the relations do affect the selection of the organisations' accounting information systems. Management accountants must select a particular information system from among different alternatives and this choice establishes a basis for communicating managerial accounting reports. Namazi (1985, p. 114) suggested three different report outputs that reflect different alternative systems,

> ...an accounting information system that reports output only; and accounting information system that reports both the output and labour's

effort; and accounting system that incorporates additional endogenous variables that affect the production process and Pareto-optimal fee schedules

The demand for the different output could be due to different reasons. According to Gjesdal (1981) and Watts and Zimmerman (1979), one of the possible reasons is where the investors demand information about actions that are taken by the managers. Investors usually delegate decision making to managers and information is needed for the purpose of controlling the managers. Gjesdal (1981) called this information demand as 'stewardship demand'.

Agency theory provides as yet only a rather generalized rationale for the existence of management accounting. However if one accepts that the economic motive (pursuit utility) is significant then it does provide some important insights into the dynamics of information at the level of the firm.

Market and hierarchies

New institutional economics devotes attention to the formal aspects of organisational structural design. For example, the work of Williamson's (1979; 1985; 1992) transaction cost economics. Williamson's markets and hierarchies reflects Coase's (1937) views on the voluntary exchange relations in a market that are replaced by

obeying directions of the 'entrepreneur-coordinator' within the hierarchical firm. As quoted by Coase (1937, p.389),

> In view of the fact that while economists treat the price mechanism as a co-ordinating instrument, they also admit the co-ordinating function of the 'entrepreneur', it is surely important to enquire why co-ordination is the work of the price mechanism in one case and of the entrepreneur in another. The purpose of this paper is to bridge what appears to be a gap in economic theory between the assumption that this allocation is dependent on the entrepreneur-coordinator

Williamson focuses on the characteristics of markets and hierarchies and the cost of transactions in each form of economic organisation. From this perspective transaction costs economics is concerned with explaining and predicting different ways of organising transactions. Change from one economic form to another occurs when transaction costs in one form become prohibitive (Flamholtz, 1983). For example, if transaction costs become too high in a market there is a 'failure' of the market and thus organisational forms (governance structures) are formed. As cited by Williamson (1993), organisational forms (governance structures) are aligned with transactions in such a way as to effect a transaction cost economizing result.

Development of management accounting in Market and Hierarchies

One of Williamson's early works that related to organisational forms was the Multidivision-form (M-form) introduction. The M-form structure is defined as one that attains optimal divisionalisation through the allocation of strategic and operating

decisions to different managerial levels and the use of appropriate control apparatus. As compared to centralised form (unitary form), the M-form would result in greater company profitability. This is because M-form is can be designed with the requisite internal control systematically implemented and strategic and operating decisions clearly differentiated. Management accounting researchers and practitioners have strong interest in these developments because of their potentially important impact on the design of management control systems (Ezzamel and Hart, 1987). The possible relevant choices for management control systems in the M-form structure relate to performance mechanisms, transfer pricing methods and the design of accounting information system for decision making.

Johnson (1983) describes the development of budgeting, planning and control from a historical perspective. He explains how the 'putting-out' system where actions come spontaneously from the market, changes to a new form of non-market organisation. In this new form (non-market), the vertically-integrated organisation would lead to dramatic changes in management accounting practices. It extends beyond production to such activities as marketing, purchasing and transportation (Williamson, 1975). The replacement of many aspects of the market in the vertically-integrated organisation requires the generation of new internal information to replace that previously provided through market transactions. Comprehensive budgets are required both for the entire enterprise and for each of it departments. There is also need for common financial measurements which permit evaluating and controlling the disparate activities of the

organisation. As the hierarchical levels are created and increase within firms, multi-divisional form will emerge and grow. Thus there is a even greater need for budgetary planning, control and translation of aims and targets down the hierarchy.

This multidivisional structure ultimately depends on internal results for its planning and control system. Traditionally the well-known system that links every phase of the giant internal activities, future as well as present, is Return on Investment (ROI) and its associated set of performance ratios. However, Flamholtz (1983) commented on the application of this theory and argued for a broader concept of economic and accounting change. A more complex and detailed accounting system is suggested.

In addition Boyns *et al* (1999) suggested that the changes in transfer price in an organisation were a combination of inter-acting forces. Changes in management responsibility, information needed and strategic repositioning therefore appear to have a systematic effect on the transfer pricing policy of the organisation. For example, the shift in power and the evolution of a managerial rather than the owner-manager's culture, resulted in changes in transfer pricing practice.

The market and hierarchies theory thus views information development within the firm as an attempt to substitute for the absence of market intelligence. The size, structure and boundaries of the organization are therefore the key determinants of the nature and change of management accounting.

2.5.5 Institutional perspectives

Neo-classical economic based theories are limited in their assumptions about the behaviour of managers within organizations. On these grounds neo-classical theory of the organization has been critised as a basis for explaining the management accounting techniques and systems found in practice. The use of agency theory and transaction cost economics have consequently been used increasingly to reflect economic based rationales for management accounting (Scapens, 1994). Agency theory and transaction cost economies were developed within mainstream economics, as an extension of neoclassical theory and are sometimes referred to as new institutional economics. However, there is also an alternative institutional theory developed in parallel mainstream economics.

Although both of the economic-based approaches recognize the importance of institutions in economic theory, they differ in the analytical status which they accord to institutions. Nelson and Winter (1982) noted the inability of these theories to come to grips with: uncertainty; bounded rationality; the presence of large corporations; institutional complexity; the dynamics of actual adjustment or change processes. For example, the theories developed within mainstream economics assumed institutions as tacit and static. However, institutions can also be exposed to a dynamic and active environment which can encourage or prevent change. Alternative institutional theory does take account of these aspects of the institution's surroundings. This theory makes

the institution the unit of analysis rather than viewing things at a macro level economic equilibrium. This makes the theory potentially rewarding for understanding the development and reproduction of management accounting practices in an organization.

Institutions

This section explains the components of an institution. There is no simple and agreed definition on 'institution'. As stated in the Encyclopedic Dictionary of Organisational Behaviour, 1st Edition, p. 242,

> The study of institutions, long as an area of interest in the social sciences, has burgeoned of late. The many diverse lines of current research display wide variation in key definitions and concepts

For example 'institutions' is defined by Powell and DiMaggio (1991, p. 146) as,

> institutions are frameworks of programs or rules establishing identities and activity scripts for such identities

While March and Olsen (1989) viewed institutions more broadly. They see the institution as a meaning system based on symbolic representations and enforced by formal and informal regulatory processes which provide models for organisational processes and structures. To say that a practice or model is institutionalized means that it has become a taken-for-granted assumption around which organisational activity is constructed. Organisational actions are less based on choice and design but more on

identifying human activity, partly through the continuing production and reproduction of habits of thought and action (Burns and Scapens, 2000).

These definitions bring out the social and cultural characteristics of institutions. They emphasise the importance of habitual behaviour. As already indicated the core assumptions of the neoclassical economics are inadequate as these social phenomena are not emphasised in their assumptions. Institutional economists argue that both individual behaviour and the workings of the market do influence an institution.

Giddens (1984) emphasised the importance of rule-based behaviour although he does not deny that people have reasons for doing things. Although individual actors may not be considered to pursue rational choices, their actions are guided by their motives. Their behaviour can also have unanticipated consequences. As indicated by Scapens (1984, p. 309),

> Individuals may be able to give reasons for following the rules and, furthermore, the rules themselves may be the result of earlier actions. Thus, although rules (and routines) may give structure and coherence to individual actions, those rules themselves will have emerged through actions

The relationship between past actions and current rule-based behaviour seems to be complex and socially constructed. Even though past actions may lead to the formation of current rule-based behaviour, there need not always be a logical and rationale connection. For example, the formation of rules may be the result of evolutionary rather

than rational choices and unanticipated consequences in the past actions. Besides, the possible relationship between actions and rule-based behaviour, which is taken-for-granted in certain behaviours, is also a vital part of an institution.

Institution and actions

It is important to recognize that there is no single direction of causality between institutions and actions. As such the institutions that influence actions are themselves the outcomes of those actions. There is duality between institutions and actions. Nelson and Winter (1982) provide useful insights into the conceptualization of the link between the behaviour of individual actors (action) and the formation of institutions. Individual skills have an important part to play in the routinization of organizational behaviour. Skills are largely programmatic and based on knowledge that the individual acquires through day-to day behaviour. However, the day-to-day behaviour still involves choices for the individual and skillful actions may be taken-for-granted (without conscious awareness). The individual or the actor will 'keep' to the habits and routines which have proved to be effective in the past. The effective routines in the past will subsequently become institutionalised. Routines need not be highly formalized organizational procedures, they might include 'rules-of-thumb' which managers habitually use in particular situations. Routines are most likely to be located at the level of practical consciousness and grounded in tacit knowledge which is useful in coping with an uncertain and complex environment.

Rules and routines

According to Nelson and Winter (1982) rules and routines are the processes through which organizational traits are transmitted through time. Further, with the rules and routine operation it is simpler for the members of the organization to continue their jobs as they know what routines and when to perform them. This information needs to be stored primarily in the memories of the members of the organization before organizational routines can be reproduced. But to view the entire organizational memory, as suggested by Nelson and Winter (1982, p. 105) there is a need to consider the links between individuals.

> ... to view organizational memory entirely in terms of the memories of individual is to overlook, or undervalue, the linking of those individual memories by shared experiences in the past, experiences which have established the extremely detailed and specific communication system which underlies routine performance

Intra-organisational conflict exists but within the bounds that are consistent with the ongoing routine. Thus to overcome the conflict, each member must play his or her individual role within the overall organization routines.

These routines do change as the environment that the organization is in changes and organizations do need to respond. In order to survive, organizations must develop routines to cope with the rapid changes. Different environments will require the adoption of different procedures. For example, informal procedures and considerable

team working are more common for organizations that are exposed to rapid changes in their technology. While more formalized and hierarchical procedures apply in organizations using more stable technology.

In the context of organizational change Scapens (1984) has distinguished between evolutionary (routines) change and revolutionary (critical) change. The adaptation to evolutionary change could be through for example, replication, contraction and imitation (Nelson and Winter, 1982). In Giddens' structuration theory, the organization routines evolutionary processes get modified in response to wider institutional changes. Three inter-related dimensions of significance, domination and legitimation, each with its own modality which is drawn upon in the reproduction of systems of interaction, thereby reconstitute the structural properties. Macintosh and Scapens (1990) explored similar dimensions on the usefulness of structuration theory to management accounting. Revolutionary change, however, involves a significant disruption of established routines. The existing institutional routines are challenged and conscious choices have to be made before the new routines can be established.

Burns and Scapens's (2000) and Scapens (1994) adopted institutional theory to develop a framework for conceptualizing management accounting change. It not only stresses the stability embodied in rule-based behaviour and routine organisational systems and practices, but also recognizes that rules and routine can change. Change in rules and routine is explained by the actions and institutions through the agency-structure

relationship discussed in the social sciences. In an agency-structure relationship, routines may have either deviated from the original rules or were not set out in the form of any rules. Giddens' structuration theory is an example for the explanation of the relationship between the actions of knowledgeable human actors and the structuring of social systems. Systems and structures are distinguished in Giddens' theory. Burns and Scapens (2000, p. 7) compared systems and structures as,

> Systems comprise, discernibly similar social practices which reproduced across time and space through human actions, and structures, which bind those social practices into systems

These systems and structures terms are implicitly used in Hamilton's (1932) institutional definition where institutional was defined as a way of thought or action of some prevalence and permanence, which is embedded in the habits of a group or the customs of a people. These definitions implicitly contain systems which refer to 'thoughts and actions of some prevalence and permanence' and a structure which reflects 'embeddedness in habits and customs'.

2.5.6 Studies on management accounting change

Although the system and structure concepts do contribute to understanding the nature of management accounting, structuration theory is not particularly helpful for exploring processes of change. As argued by Archer (1995), structuration theory does not incorporate historical time. Barley and Tolbert's (1997) structuration theory outlines a

framework describing the process of institutionalization. Burns and Scapens (200, p. 11) summarized the process as,

> ... The routines themselves can be institutionalised. In other words, they become the taken-for-granted way of behaving; disassociated for their particular historical circumstances. They become the unquestioned (and unquestionable) way of doing things. The institution is the taken-for-granted assumption that these routines represent the appropriate behaviour for the particular social group, and the routines themselves are the local instantiation of the institution. The more widely and deeply the institution is accepted, the more likely it is to influence action and to resist change

Burns and Scapens (2000) adopted the essential features of structuration theory and the process of institutionalization in two case studies of management accounting change. Two different types of management accounting change were derived: formal or informal (intended or unintended) and regressive or progressive. Formal change occurs by conscious design usually through the introduction of new rules or the actions of a powerful individual or group. For example, this has occurred in many organizations with the introduction of new techniques such as Balance Score Card. Informal change however occurs at a more tacit level, for example adapting new management accounting techniques or systems through time. Regressive and progressive charge emerge from the individual behaviour. Regressive change refers to ceremonial behaviour that comes from a value system which discriminates between human beings and preserves existing power structures. This restricts the institutional capacity to change. Progressive change however, refers to instrumental behaviour that emerges from a value system which applies the best available knowledge and technology to problems and seeks to enhance

relationships. Therefore progressive change can also describe the displacement of ceremonial behaviour by instrumental behaviour.

Vamosi (2000) further suggested that the organisation's management accounting practices are to a large extent a consequence of changes in the environment. Through the process of change, the ways of thinking, habits, routines and cargoes-of-thoughts cannot easily be wiped out. Despite huge institutional changes in the environment, management accounting at the same time is characterized by continuity: stability or continuity which ensures the connection between past, present and future. According to Granlund (2001), stability in general is the opposite of change but in an ambiguous way.

Vaivio (1999) and Innes and Mitchell (1990) however traced the mechanism of management accounting change and said that it was driven by dynamic forces and systematization of non-financial measures which is an essential phase of the change process. Systematization of measurements integrated into the company's management process adds a new dimension to the institutionalist framework of management accounting change. Currently, the institutionalist framework in management accounting change is conceptualized as being formal or informal (intended or unintended) and evolutionary or revolutionary. However the change can also be conceived along the systematic and unsystematic dimension. As a result, revolutionary change in management accounting routines is associated with an intended and systematic organisational initiative.

2.5.7 The labour process perspective

An increasing number of researchers have begun to adopt diverse critical perspectives to explore and investigate the roles of accounting practices in society. Critical perspectives explore and justify the accounting practices by their singular attention to interrelate them to issues of conflict, domination and power. For example, rather than treating various managerial accounting practices as a response to transaction costs or markets and hierarchies or agency cost considerations they are treated as modes by which the extraction of labour from labourers is made possible (Hopper and Armstrong, 1991).

In understanding the foundation of labour process analysis, it is necessary to consider the underlying assumptions about capitalism and the position of labour. The understanding of capitalism as historical totality is fundamentally relevant. As stated by Covaleski *et al.*, 1996, p. 17) as,

> Understanding the historical novelty of this feature is crucial, for this defining aspect of modern economies which we take for granted is, as a general phenomenon, unknown to prior epochs of human history

Totality is the idea that the political economy of capitalism is pervaded by the search for a means of yielding a profitable surplus that affects virtually all social and economic institutions. Capitalism emerges and develops from 'bonded labour' where labour is re-

constituted as a commodity that is freely bought and sold in the market as 'wage labour'.

The problem to the employer of a capitalist institution is to control and organize the labour process. There is a need for such labour process control to ensure that a surplus value over the above 'mixed' cost of production such as raw material and machinery is extracted from the productive units or services produced by the labour. However, the surplus value exists only after the products or services are subsequently sold in the market. Until it is sold the labour power is worthless or the wages is a liability to the capitalist.

Treating labour as a commodity is problematical as labour has no 'obsolute' interest in doing more than securing the highest wages and best conditions for the minimum of sacrifices. Thus, there is uncertainty involved in buying labour time as quoted by Braverman (1974, p. 57),

> In this setting of antagonistic relations of production the problem of realizing the 'full usefulness' of the labour power he has bought becomes exacerbated ... When the capitalist buys buildings, materials, tools, machinery ... he can evaluate with precision their place in the labour process. He knows that a certain portion of his outlay will be transferred to each evaluate with precision their place in the labour process. He knows that a certain portion of his outlay will be transferred to each unit of production and his accounting practices allocate these in the form of costs or depreciation. But when he buys labour time, the outcome is far being either so certain or so definite that it can be recognized in this way, with precision and in advance ... thus become essential for the capitalist

> that control over the labour process pass from the hands of the workers into his own

The quotation illustrates that labour cannot be treated the same as the other costs of production. Treating human beings as just another factor of production sets the stage for the exploitation and expropriation of labour by capital. Accordingly, there is an irreducible conflict and this is problematic in the relationship between capital and labour as there is uncertainty in 'buying' the labour time. Due to this problematic relationship, accounting has fleshed out: rather than taking-for-granted that accountants participate only in legitimizing and sustaining, accountants are also involved as a 'political process' which lend support to management's control and regulate over labour. Change in management accounting represents management/owners' attempts to further exploit labour through tightening controls and enhancing capitalist oriented motivation.

2.5.8 Labour process perspectives in management accounting

Hopper *et al.*, 1987 introduced the labour process perspective to accounting by contrasting this perspective from both traditional and interpretative (labeled by them as 'naturalistic' approaches) understandings of managerial accounting. The comparison is illustrated in two tables. The first considers eight features of management accounting from both traditional and interpretative perspectives and leaves some questions

unanswered. The second table provides the unsolved problems from the critical perspective's point of view. Covaleski *et al.*, 1996, p. 18 argued that,

> management accounting cannot be properly understood except in the light of the social relations of production. According to them to view organizations as united by a common purpose is to fictionalize what is, in fact, a site of irreconcilable conflict

The role of management accounting legitimizes partisan interests, contributing to the control and domination of labour and reinforcing the dominant mode of production. Labour process theorists deny that management accounting tools serve to enhance efficiency for all parties in the organisation. For example, management accounting can show the ambiguous position of managers within capitalists firms. According to Hopper *et al.*, 1987, p. 450-451, the managers are agents of the capitalists and accordingly serve the interests of the latter. The managers on the other hand are interested to secure their own employment by fighting for a greater share of the available resources. Thus one may say managers are 'acting' dual roles, 'agents and victims' of the capitalists. This situation has led to budgeting problems such as budgetary slack which is not the consequence of some 'individual pathology' but rather 'the deep effects of exploitative and oppressive social structures' that exist within the capitalist system of production (Covaleski *et al.*, 1996).

Hopper and Armstrong (1991) argued that some of the accounting and cost information was not used for making the production process more efficient but rather used to

intensify the extraction of labour from the labour force. For example, the organizations of the mid-nineteenth century increased or secured their profits primarily by extending the number of hours worked without significantly changing the wages and a closer degree of control over the labour process. Technical improvements such as 'stretch-out' (an increase in the number of machines supervised by each operative), the 'speed-up' (an increase in the operating speed of the machines) and 'premium bonus system' for overseers to enforce productivity have been adopted. Moreover, the decline and replacement of internal contracts (the employers outsourcing the products and skilled labour to their junior counterparts through systems of apprenticeship) during the latter half of the nineteenth century by those college-trained executives has lead the company to keep its employees' record. It was necessary for the company to keep records as those college-trained executives lacked the practical production know-how. The records showed the hours worked by the contractors' employees or of how much and on what basis they were paid (Hopper and Armstrong, 1991 p. 416).

The creation of internal cost records not only permitted a reward to the worker but also acted to intensify and discipline the labour. These new records eventually laid the foundation for the later development of standard costing systems which have nothing to do with gaining efficiency or reducing transaction costs but are a means of redistributing profits to the companies. Hopper and Armstrong (1991) argued that besides the development of standard costing, the introduction of return on investments measures and budgets cannot be understood in isolation but are deeply intertwined with

the expropriation of profits, the intensification of the labour process and the surveillance of worker activities. And management accounting is one element where this 'implicit intention' can be seen.

2.5.9 The Foucauldian perspective

Over a period of twenty years Michel Foucault has worked on what can be called a series of histories of the emergence of the human sciences. His first book was published in 1954 (Puxty, 1993) and covered a range of subjects including psychiatry and medicine. His work has generally focused on the period around 1800, which he sees as a crucial point in the formation of the modern era. Parallel to these historical studies a number of methodologies issues concerning the understanding of historical processes have been addressed (Foucault, 1972; 1981). A recurrent theme which has emerged in his work is the issue of power/knowledge relationships and here there is significance for accounting.

Foucault's approach to historical knowledge is concerned with two methods, genealogical and archaeology. The genealogical question concerns the role of historical investigation as expressed by Miller and O'Leary, 1987, p. 237 in the following terms,

> Genealogy concerns centrally a questioning of our contemporarily received notions by a demonstration of their historical emergence. The

> point of history in this sense is to make intelligible the way in which we think today by reminding us of its conditions of formation'

Genealogy

Genealogical analysis helps in an appreciation of the existence of a particular phenomenon in the different fields of study mentioned above. The genealogy approach is also concerned with tracing the emergence of frequently unquestioned contemporary rationales. These contemporary rationales will be viewed with reference to a complexity of dispersed events in which a single point in history will be the point of origin. Even if it does not directly address accounting, such an approach is useful in an attempt to understand accounting as a social and organizational practice. For example, contemporary forms of cost and management accounting theory and practice may be better understood by situating them historically (Preston, 1992, p. 64) at their point of origin.

Archaeology

The second aspect of Foucault's work is an archaeological question concerning the way one goes about doing history and is cited by Miller and O'Leary (1987, p. 238) as,

> Its focus is on our most legitimated forms of contemporary discourse, and the real historical conditions which have led to their emergence. It

> concerns the more sociological aspects of the emergence and functioning of discourses as well as their internal conceptual features
> Archaeology directs the attention to these features of discourse and it is always about something in the universe which is referred to as objects. Sheridan (1984) suggests that discourse is not merely about objects, but what constitutes the objects. The object (which may include situated social practices) and the discourse itself, emerge together and are shaped by social, cultural and institutional arenas in which they make their appearance. Thus, archaeology is formed in a complexity of relations established between a heterogeneous range of discourses and practices. Foucault (1972) refers to this intersection across fields and the dispersion of discourse as 'discursive formation'. In applying this method accounting is intertwined with a complex group of relations within which accounting exists.

It could be argued that genealogy in many ways incorporates archaeology and indeed, an element of genealogy was always implicit in archaeology (Puxty, 1993, p. 110). It is the genealogical approach that is normally favored by accounting researchers and several of them will be discussed in the next section.

Power/Knowledge

The third aspect of Foucault's work concerns the relationship between knowledge and power. He suggests there is an implicit relationship between the development of modern societies in terms of power and its mode of exercise. The obvious development he suggests took place around 1800 and involved a shift from sovereign power to disciplinary power.

Miller and O'Leary (1987, p. 238) expressed this shift of power as follows: sovereign power is as,

> ...a diminished form of power. Its ultimate recourse is seizure of things of bodies ultimately of life

while disciplinary power is,

> ...much richer and entails penetrating into the very web of social life through a vast series of regulations and tools for the administration of entire populations and of the minutae of people's lives

Foucault's arguments concerning power is closely linked to knowledge. The shift from sovereign to disciplinary power is intimately connected with changes in knowledge. He expressed this relationship in the formula 'power/knowledge'. These two interdependent terms can be seen in the operation of human sciences and their relation to the elaboration of a range of techniques in supervision, administration and disciplining of populations of human individuals.

2.5.10 Foucauldian perspective in management accounting

This section will demonstrate the aspects of Foucault's work which has sparked much attention in the academic accounting debate. Miller and O'Leary (1994) studied the rising popularity of standard costing and budgetary practices in the US during the first three decades of the twentieth century. Using a Foucauldian perspective, they illuminated dimensions of that much studied period that have hitherto escaped attention.

This is seen to have significant implications for the relevance of historical investigation to the understanding of contemporary accounting practices. The core of their argument is that standard costing and budgeting cannot simply be seen as a rational development to improve the accuracy and refinement of managerial information. Rather, it is an important calculative practice which is part of a wider modern apparatus of power which emerged conspicuously in the early years of this century. The concern of this form of power is seen to be the construction of the individual person as a more manageable and efficient entity. In the case of cost accounting, this meant making visible 'crucial aspects of the functioning of the enterprise such as questions of wastage and efficiency'. This visibility focused on the individual person, by 'surrounding the individual at work by a series of norms and standards, so that the inefficiencies of the person were rendered clearly visible' (Miller and O'Leary, 1987, p. 239). The shift was from direct confrontations between the worker and the boss (nineteenth century) to employees becoming surrounded by information on them in the form of calculative norms and standards (twentieth century).

Other arenas examined by Miller and O'Leary (1987) are the whole discourse of national efficiency through, for example, the eugenics movement and the drive for mental hygiene. Their argument is to explore the connections of standard costing and budgeting with scientific management and industrial psychology. The knowledge is then related to others which, more or less simultaneously, were emerging beyond the confines of the firm to address questions of the efficiency and manageability of the

individual. Thus, the conclusion is that one cannot understand the developments of cost accounting within the workplace purely as technical improvement. It is located amongst the social and organisational management of individual lives and the way to understanding this network of practices (and change therein) is genealogy and archaeology.

Walsh and Stewart (1993) explored the historical development of managerial accounting practices from a Foucauldian perspective by comparing the two assemblages of people making things from the 1700s and 1800s. Some distinguishing features of these two centuries may provide some of the reasons for the fact that management accounting calculations and measures did not exist prior to the late eighteenth century. Instead the manufacturers of the late seventeenth century adopted these practices:

a) customary rather than market driven rates or profit calculation of selling price and wages
b) managers of the mills were known as masters and the workers as servants
c) use of fines, pillory and the prison as threats of retribution to managers and workers for pilferage or shortages in piece work
d) bookeeping was the physical memory of the real proceedings of each day and each week to be certified by the masters (Walsh and Stewart 1993, p. 786)

The application of Foucault's perspectives is not limited only to the past but to a wider scope. As quoted by Covaleski *et al* (1996, p. 23),

> ...application of Foucault's insights into the functioning of modern societies is not limited to forays into the past. More pertinently, his work proves to be of continuing value as it is being profitably used to illuminate certain aspects of the contemporary uses and redefinitions of accounting

For example, Rose's (1991) study explores the specific links between democracy, as a mentality of government and a technology of rule and qualification, numeracy and statistics. The democratic power is 'calculated power, calculating power and requiring citizens who calculate about power' (Rose, 1991, p. 673). As stated by Rose (1991, p. 691),

> numbers have an unmistakable power in modern political culture

Foucault's view is that democratic government is formed along with other various calculations such as numerate and calculating citizens, numericized civic discourse and a numericized programmatics of government. Miller and Rose (1990) also applied a wider discursive field in their study by analysing the exercise of political power in advanced liberal democratic societies. There are not just 'political' authorities but the emergence of unemployment, crime, disease and poverty also needs to be considered. Such social existence aspects do relate to the implementation of policies in the political authorities.

Foucault's framework had also been utilized by several studies from different areas. For example, Preston (1992) discovered that a web of complex events is seen as part of the transformation of accounting practices in the US hospitals. Events including Medicare and Medicaid, the private structure of American health care, the power of professional associations, changing public attitudes towards health care, are seen as being part of this transformation of accounting practices. Ezzamel (1994) utilizes Foucault's framework of power/knowledge relations to a UK university. It demonstrates how and why the budgeting system may fail to operate as a disciplinary regime. The analysis also provides a good illustration of the dynamics of power in modern institutions which show how actors may react to the exercise of administrative power, resistance by them and how their actions can be both the consequence and determinant of the actions of their superiors.

Hoskin and Macve's (1988) study focused on the genesis of the new managerialism in US businesses and factories. The preeminence of the USA in the development of cost and management accounting was due to the influence of the engineering graduates of the military academy. It is suggested that the sphere of elite education provides a wider and deeper new human ecosystem than a specific socio-economic system. People who undergo that education will internalize this new regime of organisational disciplines and human accountability. These new wide ranges of privy power-knowledge relations are then exported to the world of business.

2.6 SECTION FOUR

RESISTANCE TO MANAGEMENT ACCOUNTING CHANGE

The previous sections have demonstrated the different dimensions, the range of causal factors associated with management accounting change and several management accounting process theories which can be used to explain development and change. The process of management accounting change will be a success only if it is acceptable to all parties concerned. On several occasions members of the organisation might contest management accounting change. The resultant barriers and hurdles are known as resistance to change.

It is important when studying change not to ignore resistance as it may influence any of the management accounting change process. As noted by Scapens and Roberts (1993, p. 1),

> It is important not to dismiss resistance to accounting change as illogical and emotional. Such resistance is probably informed by a whole variety of very real concerns and fears. It is only by exploring the organisational and historical contingencies which influence the process of accounting change that resistance can be understood.

This section summarizes some main causes of resistance to management accounting change in organisations. Several studies on the issue have identified possible reasons for the resistance or lag in management accounting innovation. Firstly, managers and senior company management have not supported or emphasized the need for the

implementation of management accounting innovation. There has been less support from them for management accounting innovation as they may fear that with an innovation their activities will become more visible to management (Scapens and Roberts, 1993; Innes and Mitchell, 1990; Kaplan, 1986; Bruns; 1987; Cooper *et al.*, 1992). However senior management should influence or convince managers on positive contribution of the new approach or innovation to diffuse its threat (Cooper *et al.*, 1992). Implementing managerial accounting controls also shows that most subjects activate a human theory of control to deal with any embarrassment of threat (Argyris, 1990). They will 'exercise' anti-learning and over protective attitudes when dealing with embarrassment or threat and this may be called defensive. It is through these defensive reactions that the implementation of managerial accounting controls are resisted.

Secondly, inadequate role models together with lack of knowledge and experience of the new techniques or methods will also create uncertain phenomena to these managers (Kaplan, 1986; Burns and Scapens, 2000). Hence the uncertainty among these managers will lead them not to aggressively support the new project and result in its resistance or failure (Bruns, 1987). Most managers feel comfortable if the new accounting system or techniques are established within existing rules, routines and institutions. Burns and Scapens (2000) relate this behaviour to 'mental allegiance' in which most managers prefer to establish ways of thinking and doing, embodied in existing routines and institutions. The more widely and deeply embedded the institutions, the greater is the

likelihood of resistance to change. According to Hardy (1996, p. 8), explicit power used to introduce a new system is able to resist the change as this power 'is embedded deep within an organizational system that everyone takes for granted'. As Buchanan and Badham (1999) argue, this power that lies in the 'taken for granted' ways of doing things is more difficult to challenge since it is less visible and less tangible.

Thirdly, resistance or lag to management accounting change could also be due to the complexity and difficulty of modifying the existing computerized accounting systems (Kaplan, 1986; Bruns, 1987). Failing to consult the systems users at a sufficiently early stage will result in more resistance to change (Scapens and Roberts, 1993). Therefore, it is useful to have adequate necessary preparation before any management accounting change is introduced.

Finally, other possible reasons for resistance to management accounting system change include lack of adequate role models on the success of the new techniques (Kaplan, 1986). Lack of adequate preparation necessary for changes in thinking and decision making within the organisation is also a fundamental cause of delays in acting on management accounting change (Cooper *et al.*, 1992).

2.7 SUMMARY AND IMPLICATIONS FOR THIS STUDY

2.7.1 Summary

Many researchers have focused on management accounting change within the organization. Most have reviewed it as an outcome. Little attention has been given by researchers to the nature of change i.e. the different types of management accounting change and the processes that have taken place to effect it. Since management accounting change is not a homogeneous event and occurs in a dynamic world, one could expect that the factors that cause the changes are numerous. Little consideration has also been given by most management accounting researchers to the exact specification of the full range of causal factors. As a result of this, many different terms have been used for similar causal factors and introduce studies have focused on a limited number of them. Also little emphasis has been placed on the interrelations between the causal factors.

Different change dimensions and causal factors are not the only important elements in any management accounting change process. The process can be viewed from a variety of perspectives. These range from the organizational situational analysis of contingency theory through the economic motive inspired agency and transactions costs theories to the behavioural analysis of institutional, labour process and philosophical approaches. Each of these emphasises different aspects of change and all aid its understanding. That

so many alternative interpretations can be made emphasises just how complicated and complex change processes can be.

2.7.2 Identifying implications for this study

Management accounting and control systems (MACS) have a wide scope which includes managerial calculations, cost accounting, management control systems and performance measurement. Due to this, change in management accounting may take many focus. It is not a homogenous phenomenon. This inherent variety leads to the possibility that management accounting researchers study different types of changes and this may have important research implications when studies are compared and contrasted. Therefore it is important to be specific about the type and dimension of management change prior to any management accounting research.

The first contribution from the literature review is the use of five possible dimensions of management accounting change. They are grouped to reflect the examination made of how researchers to date have addressed the issue of management accounting change. They are listed as follows:

1. Introduction of new techniques as replacement for existing ones.
2. Introduction of new techniques where no management accounting previously existed.

3. Modification in the management accounting information or output.
4. Modification of the technical nature of a management accounting technique or system.
5. Removal of a management accounting technique or system with no replacement.

The use of these five possible dimensions of management accounting change ensure that in this study change is not considered homogeneous or uniform. Identifying these dimensions will show clearly what type of management accounting has taken place.

Identifying the factors that cause management accounting change is another important element in explaining any management accounting change. The second contribution from the literature review is the grouping of the possible causal factors from previous management accounting change research into appropriate categories for use in this study. These groupings are necessary as prior research has lacked in exact specifications of the causal factors. Indeed many different terms have been used for similar though perhaps not identical factors. For the purpose of this study, they are two major categories: macro-context factors and micro-organisational aspects. The significance of these intervening factors (see Figure 3, p. 91) will contribute to answering 'why' management accounting changes take place. In addition to these two major categories, there are other environmental factors which include economic, political and social contexts. Grouping these intervening factors into their appropriate categories allows the study to identify the effect of each of the factors on management accounting change.

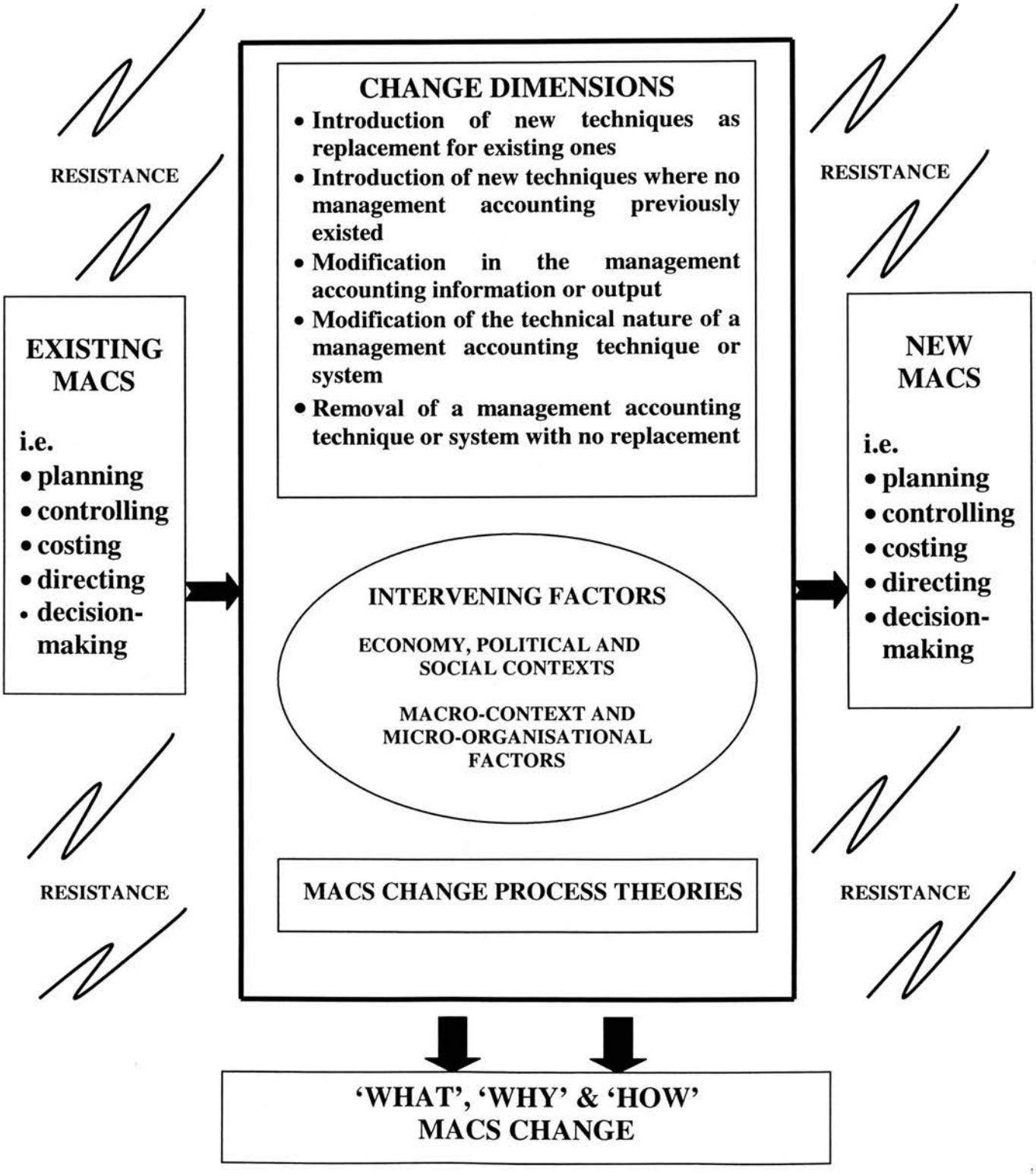
The third contribution of the literature review is to demonstrate the range of theoretical perspectives from which change in management accounting can be studied. Given that all have a research validity any specific study is likely to be partial in its analysis of change. While the specific choice of a contingency framework has been made for this study the broad review undertaken (a) provided a sound foundation for change analysis and (b) allowed the researcher to recognize that many factors not used in contingency theory are likely to impact on management accounting change. This may explain the significant but limited explanation found by using contingency theory (Libby and Waterhouse, 1996; Williams and Seamans, 2001). Of all the possible alternatives contingency theory provided a coherent approach which (1) met the aims of the study to explore the nature and causes of change and (2) fitted the background and knowledge of the researcher who had no prior exposure to the economic or critical perspective literature. The broader review undertaken also widened the researcher conception of possible contingent variables.

Finally the literature review contributes several main causes of resistance to management accounting change. It is essential not to ignore this issue as it may influence the management accounting change process. Understanding the potential barriers to change may help explain differences found in the cause/effect patterns across organisations.

In summary, Figure 3 demonstrates the management accounting change process adopted in this study. It highlights 'what' constitutes these changes and 'why' and 'how' they have come about. Adopting this structure therefore enables this research to build on, through significant extensions, the research already undertaken on management accounting change.

FIGURE 3

THE MANAGEMENT ACCOUNTING AND CONTROL SYSTEMS (MACS) CHANGE PROCESS



CHAPTER THREE

RESEARCH DESIGN

3.1 INTRODUCTION

A dual approach was adopted in studying change. Both survey and case study methods were adopted. This matched the orientation of the existing research literature and the two approaches were complementary and provided scope for some useful methodological triangulation. This chapter is divided into three main sections. The first section covers several sub-sections on survey research: background; objectives; questionnaire development and design; sample description; mailing process; returns; response bias; non-response bias; survey advantages and disadvantages. The second section covers discussion on adopting triangulation by this study and it includes: value of methodological triangulation; reasons for adopting methodological triangulation; how methodological triangulation works and filling the gaps. The last section covers

several sub-sections on the case study research: objectives; case study advantages and disadvantages; selection of the case study company and methods used in the case study.

3.2 SECTION ONE

SURVEY RESEARCH

According to Bryman (2001, pp.450 - 453),

> ...survey is a quantitative research which tends to bring out a static picture of social life...Survey was designed to provide information about the degree to which there was a consensus among members of the sample about certain circumstances

Survey or quantitative research tends to conceptualize reality in terms of variables and relationships between them. Generally survey includes population identification and a fraction of it is set (Fowler, 1993, p.1). This fraction is called sample in which information is collected and analysed. Survey looks for relationships between variables so that causality may be experienced and accurate prediction becomes possible. Fink (1995) also suggests that surveys involve setting objectives, designing research, preparing reliable and valid data collection instruments, analysing variables and reporting the results. The objectives of a survey can come from reviews of the literature and other surveys. According to Field and Morse (1985), the effect of context that relationships between the variables are generalized, can be predicted in all settings, at

all times. Quantitative research could therefore be depicted as relevant to the establishment of findings at the larger scale or macro level (Bryman, 1988).

3.2.1 Background to the survey

This aspect of the empirical study is based on a review of management accounting change literature. The review shows that management accounting change researchers have commonly adopted case and field study as their research methods. Management accounting change researchers less commonly used survey, literature and historical analysis. The management accounting change literature review undertaken has highlighted novel and current issues to be adopted by this study. There is a lack of explanation and study on the definition of change and on different types of change. It is also notable that the survey method has not been widely used by researchers in this area. It is the intention to use the survey to obtain a wider and general investigation of management accounting change than that which could be obtained by the other most commonly used methods, case and field study.

According to Brownell (1995, p. 32), the most common method of data collection in survey research is the structured questionnaire administered to a sample of respondents. The form of administration is either by way of written questionnaire or by interview (personal or by telephone). The principal strength of the written questionnaire is its low

cost of administration (Linsky, 1975). As the number of sample companies selected is large (360 companies), written or self-administered questionnaire is therefore adopted by this study.

Libby and Waterhouse's (1996) and Innes and Mitchell's (1990) studies were particularly influential in the design of this study. The model developed by Libby and Waterhouse (1996) has also been replicated and extended by Williams and Seaman's (2001) study. The merits of replicating accounting research have been succinctly conveyed by Otley *et al* (1994), Cotton *et al* (2003), Chenhall (2003) and others. Several limitations from Libby and Waterhouse's (1996) and Innes and Mitchell's (1990) studies are addressed in the design of this research. Firstly, no specific definition of management accounting change is included in either of the papers or any differentiation made between different types of changes. For example, the changes in MACS are measured in Libby and Waterhouse (1996) simply by the number of changes in a specified time period. This limited definition of accounting change has however been critised by Granlund (2000, p. 155). The type, significance, success of the changes and the extent to which the changes were integrated into daily operations by the organisation during the specific time is ignored. As stated by Libby and Waterhouse (1996, p. 145),

> ... the method of this study did not allow for an evaluation of the significance of each change (ie: some changes may have been more important to the organisation than others) ...

Secondly, both studies have identified the causal management accounting change factors but neither of the studies allows for evaluation of the significance of each factor to the organisation's MACS. Libby and Waterhouse's (1996) regression model only measured the effects of four variables potential. The regression model only explain 16% of the variance in changes to management accounting systems. This suggests that additional variables could be added to the model to refine measurements (Williams and Seaman, 2001, p. 457). In addition they lack explanation of the relationship between these causal factors and do not attempt to provide an exact specification of them. Indeed many different terms have been used by other researchers for similar factors. A thorough study on literature reviews shows that the majority of prior researchers have only implicitly mentioned the selection of potential causal factors in their management accounting change studies. None of them adopt *all* the factors in their management accounting change studies.

Thirdly, Libby and Waterhouse (1996) have neglected any explanation of the management accounting change process. Integration in a change process by the four potential variables used in the study was not explained. Similarly, Innes and Mitchell's (1990) study does indicate the process of management accounting change is associated with a specific set of circumstances but there is no explanation on how these affect the changes. The circumstances are termed as motivators, catalysts and facilitators. Furthermore, neither of these studies have shown how these factors actually mobilise people to affect change.

Finally, both of the studies have not specifically included possible reasons for any resistance to management accounting change. Identifying these reasons is of direct practical importance, as it will assist companies to minimize or overcome any resistance to the introduction of new techniques or systems or the modification of existing systems in the future.

3.2.2 Objectives of the survey

The survey objectives are its particular purposes or hoped for outcomes (Fink, 1995, p. 81). Fowler (1993, p. 95) further stressed that a good survey should decide on what is to be measured and accomplished. The objectives of this survey are therefore set as follows:

1. To analyse the different dimensions of management accounting change in Malaysian main and second board companies. These dimensions will show 'what' type of management accounting change has taken place in these companies. Planning, controlling, costing, directing and decision making systems with their 23 sub-categories represent the management accounting control system (MACS) scope for this study. This is consistent with Libby and Waterhouse (1996). The survey will also analyse the significance and success rates of these systems. A five year

period (i.e. 1997 to 2001 inclusive) has been chosen for this study. This period is chosen as most of the Malaysian companies were facing an economic slow down and this may direct or indirectly affect most of the companies' management accounting systems (Edward and Newel, 1991; Klamer and Walker, 1984; Armstrong, 1985).

2. To determine the significance of each of the intervening factors (macro-context factors and micro-organisational aspects) on the companies five MACS: Planning, Controlling, Costing, Directing and Decision-making. Macro-context factors consist of competition, market and consumers. While micro-organisational aspects are represented by: organisation structure; managerial policies; cost structure; production technology; problems of existing techniques; employees; deterioration of financial performance. The significance of the intervening factors will contribute to answering 'why' management accounting change takes place. It is also the objective of this study to extend the four independent variables by way of improving Libby and Waterhouse's (1996) MACS change regression model and analysis.

3. To compare the analyses of this study to those of Libby and Waterhouse (1996) and Williams and Seaman (2001) by examining the extent and causes of changes in MACS in each country within different

environmental circumstances. The benefits of the cross national generalizability of results have been endorsed by Birnberg and Snodgrass (1988) and Harrison (1993), among others.

4. To explain factors that contribute to management accounting change resistance in any of the main MACS: Planning; Controlling; Costing; Directing; Decision-making.

3.2.3 Development of the questionnaire

This study is designed to extend and improve (through addressing the above limitations) the approaches adopted by Innes and Mitchell (1990) and Libby and Waterhouse (1996). It also draws on a contingency theory framework as an explanation of change. The first contribution of this study is the use of the five alternative dimensions of management accounting change. The five possible dimensions of management accounting change are listed as follows:

1. Introduction of new techniques as replacements for existing ones
2. Introduction of new techniques where no management accounting previously existed
3. Modification in the management accounting information or outputs

4. Modifications of the technical nature of a management accounting technique or system
5. Removal of a management accounting technique or system with no replacement

These five management accounting change dimensions are then applied to different types of management accounting change areas. Various categories of management accounting change have been identified from extensive review of current management accounting literature. This review showed that management accounting change could take place in numerous areas of management accounting. These various areas are best represented by management accounting control systems (MACS). Macintosh (1994, p. 2) relates MACS as,

> ... sometimes they are referred to as planning and control systems; sometimes management control systems and sometimes simply control systems. I call them management accounting control systems to signal my primary concern with management accounting system ...

It can be seen from the quotation that MACS can also be referred to as management accounting systems (MAS). Mia and Clarke (1999) viewed MAS as a system which provides information relating to measurement, control, evaluation and reporting of costs, activities and performance.

Due to the wide scope of MACS, Libby and Waterhouse (1996) identified five main MACS and their 23 sub-categories are replicated in this study (see Appendix A). The main MACS consist of: Planning; Controlling; Costing; Directing; Decision-making. These groupings are consistent with the goals of MACS cited by Atkinson *et al.*, (1997, p. 690) as,

> 1. to aid the organisation in planning for the future
> 2. to monitor events in the external environment and their effects on the design and functioning of the MACS
> 3. to measure and record the results of activities occurring inside the organisation to ensure that decision makers are well informed
> 4. to motivate individuals and groups who are affected by and who affect the MACS
> 5. to evaluate the performance of individuals and groups in the organisation

An extension of the Libby and Waterhouse (1996) use of the causal factors for management accounting change is also made. Additional causal factors from a thorough review of the management accounting change literatures are included. The review shows that several management accounting change researchers have adopted a contingency theory type approach in their studies. For example, Anderson and Lanen (1999, p. 381) adopted contingency theory in their research,

> ... examined relations between a variety of endogenous and exogenous contextual factors and management accounting practices. Two exogenous factors that have been examined ... the nature of competition and environmental uncertainty national culture ... the endogenous factors most commonly examined in relation to management accounting practices in firm strategy, technology and organizational culture.

Two major categories: macro-context (external) factors and micro-organisational (internal) aspects were identified. These two categories relate to the motivation for management accounting change. External factors consist of: competition; market; consumer, while internal factors consist of: organisation activities; managerial policies; cost structure; production technology, problems of existing techniques; employees; deterioration of financial performance. As well as these two major categories, there are other environmental factors such as the economic, political and social contexts which interact as the 'overarching factors' to the two major categories. Analysis of the management accounting change literature also reveals that several factors exist in each major category.

Many different terms have been used by researchers for similar factors. The different terms adopted by management accounting researchers are specified in this study for both macro-context factors (see page 29), micro-organisational aspects (see page 40) and the 'overarching' factors (see pages 19 - 21).

These intervening factors are used in this study to assist in identifying their significance for management accounting change. Understanding the interactions between multiple contingent variables and each MACS may also help in determining their influence. This study also identifies the possible reasons for resistance to management accounting change. These possible reasons for resistance are adopted in this study to test for the

most common reasons for any resistance to management accounting change in the manufacturing organisations.

3.2.4 Questionnaire Design

The draft questionnaire was field pre-tested to find out how the data collection protocols and the survey instruments worked under realistic conditions (Fowler, 1993, p.100). Fink (1995, p. 86) further suggests that a pilot test is to monitor the ease with which respondents complete the questionnaire, administration and scoring. The pilot study was tested on six management accountants of Malaysian listed manufacturing companies. Management accountants are the target group for this study as questionnaires are more likely to be returned if they were judged to be salient to the respondent (Heberlein and Baumgartner, 1978). The six were selected at random from the Kuala Lumpur Stock Exchange (KLSE) manufacturing listed companies. According to Fink (1995, p.88), for pilot testing to be effective the respondents selected should be similar to those who will be asked to participate in the survey. As suggested by Anderson and Lanen (1999, p. 410),

> In light of the small target population and even smaller pre-test group, the intent of the pre-test was simply to identify ambiguous or poorly worded questions ... The survey was revised based on feed back from the pre-test.

Helpful comments on the questionnaire were received from the management accountants regarding:

1. Time taken to complete the questionnaire;
2. Several vague terms used;
3. Appropriate person to answer the questionnaire, and
4. Other constructive comments

As a result of the pilot test several vague questions were deleted and repetitive or unclear questions were modified (Oppenheim, 1966). Fowler (1993, p. 100) suggests that questions formed in a self-administered questionnaire should be straightforward. An eight-page questionnaire was designed after several drafts. Shorter questionnaires are often recommended for resulting in higher response rates (Linsky, 1995; Heberlein and Baumgartner, 1978; Oppenheim, 1966). To make the questionnaire as easy and quick to complete as possible, closed answers were adopted and they involved either circling a letter or ticking a box. The responses obtained in the pilot study were used to 'close' several questions in the questionnaire (Brownell, 1995, p.38). The only writing required of the respondent was to enter the respondent's job title and length of service, company country's of origin and several other possible voluntary answers in several sections of the questionnaire. The response task itself should be easy and this is supported by Fowler (1993, p. 46) as,

> Do not ask respondents to provide written answers, except for their opinion. The response task should be to check a box, circle a number or some other equally simple task

Open answers were minimised as answers are usually incomplete, vague and difficult to code and therefore they are of only limited value as measurements (Fowler, 1993, p.100).

The questionnaire was divided into four parts and started with relatively easy, straightforward, non-taxing questions that helped 'get the respondent into' the survey (Fowler, 1993, p.99; Brownell, 1995, p.37). The questionnaire was attractively designed and printed on coloured papers and all instructions were printed in bold. Instructions at the beginning of each page were provided to develop a 'user-friendly' questionnaire. Examples for each intervening factor were also provided to respondents. As stated by Oppenheim, 1966, p. 67 – 68,

> Each questionnaire or interview form will contain instructions to the respondent ... it may be possible to give them a definition or a specialized meaning for the purpose of one particular inquiry

A copy of the questionnaire and cover letters (first and second follow-up letters) are included (see Appendix B). Each of the four parts in the questionnaire is explained below.

Part One

This part consists of three open-ended and four closed questions. Out of the four closed questions, three are ordinal and one is nominal in terms of their measurement nature. These questions are related to management accounting function. It is important to identify the nature of the respondent's management accounting function before any changes can be recognised.

Part Two

There are five main types of management accounting control systems (MACS) and their 23 extensive sub-categories listed in this part. For each of the sub-categories the respondent is expected to choose a management accounting dimension where change has occurred in the last five years (1997 – 2001 inclusive). There are six management accounting change types represented by a number and provided in a box. The respondent is expected to add any other type of MACS sub-category which is not listed in the questionnaire. The respondent is also required to indicate the significant and success of each main MACS.

Part Three

This part is divided into two types of intervening factors: external and internal factors. Examples are given for each of the intervening factors. For each of the intervening factors, the respondent is expected to choose a significance level on each five main MACS: Planning; Controlling; Costing; Directing and Decision- making. A significance level is selected from a row of five ordinal significant choices. The respondent is also encouraged to add any other intervening factors which is not listed in the questionnaire.

Part Four

This part is optional to the respondents as they are only expected to complete it if their organisation has ever faced any management accounting change resistance. Respondents are to select from any of the seven possible reasons for resistance that might influence any change in the main MACS: Planning, Controlling, Costing, Directing and Decision-making. Respondents are also encouraged to include any other reasons for resistance to management accounting change.

3.2.5 Sample description

Malaysian manufacturing companies are used as the sample for this study. For several reasons management accounting change is likely to occur in this type of company. As stated by Emsley (2001, p. 3),

> A random sample of medium-to-large sized manufacturing companies was taken from a commercial directory. These companies were chosen because management accounting systems were likely to be well developed and extensively used in those settings.

Manufacturing companies are exposed to changes in the manufacturing environment such as the movement from direct labour to machine hours (Brimson, 1986), changes in the production cost structure (Innes and Mitchell, 1990; Kaplan, 1986) and new high technological manufacturing techniques (Kaplan, 1983). Due to these changes manufacturing companies are also commonly associated with new approaches and techniques. For example, activity-based-costing (ABC) (Anderson, 1995; Anderson and Young, 1999; Shields, 1995), strategic cost management (SCM) (Shank, 1996), new management accounting system (MAS) (Amat *et al.*, 1994), Total Quality Management [Vaivio, 1999(b)] and transfer pricing (Boyns *et al.*, 1999) were introduced in manufacturing companies. Furthermore, most of the prior studies on management accounting change have also selected manufacturing companies in their survey (Libby and Waterhouse, 1996; Williams and Seaman, 2001; Haldma and Laats, 2002; Williams and Seaman, 2002), field (Kaplan, 1983; Innes and Mitchell, 1990) and case (Kaplan,

1986; Turney and Anderson, 1989; Scapens and Roberts, 1993; Amat *et al.*, 1994; Anderson, 1995; Shank 1996; Burns and Scapens, 2000) studies.

A five-year period (1997-2001) has been adopted in this study as the idea for this study was conceived in early 2001. It is also part of this study's objective to analyse if the economic environment influences the organization management accounting systems. The Malaysian economy began to be affected by the Asian financial crises in 1997. The Malaysian Economic Outlook shows the slowdown pattern of the Malaysian economy by its GDP and major components, fiscal and external balances and other economic indicators (see Appendix H) and this is summarized as follows:

Malaysian Economic Outlook[1]

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Real Gross Domestic Products (GDP) (percentage)	9.8	10.0	7.3	-7.4	6.1	8.3	0.4
Consumer Price Index (CPI) (percentage)	3.4	3.5	2.7	5.3	2.8	1.6	1.4
Three-month Interbank Rate (percentage p.a., end-period)	6.76	7.39	8.7	6.46	3.18	3.25	3.27

For the above reasons manufacturing companies were chosen as a research location for this study. The listed manufacturing companies are identified from the Kuala Lumpur Stock Exchange (KLSE). There are two major types of companies listed on the KLSE,

the main and the second board. Quantitative requirements relating to issued and paid-up share capital and shareholding spread distinguish between the main and second board companies (see Appendix C). Under each of the main and second boards, the companies are grouped according in respect of their principal activity or core business. There are thirteen and six sectors on the main and second boards, respectively (see Appendix D). There are two different manufacturing sectors on each board and they are the consumer and industrial products. Initially, there were 360 organisations on both boards. However, through careful investigation of the KLSE web-sites, forty-two (42) organizations were excluded. These organizations were excluded as thirty (30) organizations are currently under the Malaysian Government Restructuring Scheme, six (6) are being acquired or de-listed and six (6) moved without updating their new addresses with the KLSE. Therefore, the sample size was reduced to 318 organisations and this is shown in the following Table 1.

Table 1

Sample size of main and second board organisations

	MAIN BOARD	**SECOND BOARD**	**TOTAL**
CONSUMER PRODUCT	52	54	**106**
INDUSTRIAL PRODUCT	89	123	**212**
TOTAL	**141**	**177**	**318**

[1] Source: Malaysian Economic Outlook, Malaysian Institute of Research

3.2.6 Mailing process

The sample companies' office registered addresses were obtained from the KLSE's library. The questionnaire and covering letter were sent to each of the company's senior management accountant (see Appendix B). Personalizing the questionnaire is not adopted by the study as it often confounds with the 'anonymity issue' and an increase in costs. According to Linsky (1975, p. 100), aside from not increasing return rates, personalizing may under certain conditions depress the respondent. The cover letters stated the study's purpose (Haldma and Laats, 2002), its importance and request for their cooperation and were printed on the university letterhead. Respondents were also promised small tokens from Scotland for returning the questionnaires together with their business cards. This was done to increase the response rates (Linsky, 1975; James and Bolstein, 1990; Heberlein and Baumgartner, 1978). A return stamped self-addressed envelope was also included to encourage response. Both the mailed and self-addressed envelopes were written serial numbers for recording purposes and this was mentioned in the cover letter. As suggested by Fowler (1993, p. 47) as,

> It is a good practice to tell people in the covering letter what the number is for

For example, the numbers used for the main and second board organizations were from the range of MB001 to MB141 and SB001 to SB177, respectively. The three-digit number after the words MB (Main Board) and SB (Second Board) refer to each

organization selected for the survey. These numbers were also to facilitate the process of sending follow-up letters to the yet to respond organizations.

3.2.7 Returns

Eleven (11) responded to the first wave of mailing over a two weeks period. Follow-up letters sent to companies which initially failed to respond, almost invariably resulted in additional responses (Linsky, 1975; Heberlein and Baumgartner, 1978; Don *et al.* 1974; Brownell, 1995). The first follow-up letters (4th October 2001) (see Appendix B) were sent to 307 organisations that were yet to respond to the first wave. Thirty organizations responded to this reminder over a three-week period. Copies of questionnaires and second follow-up letters (26th October 2001) (see Appendix B) were sent to 277 organisations that were yet to respond to the second wave. An additional fifty-four (54) organizations responded to this third wave which increased the total number of respondents to ninety-five. This generated a 29.87% (95/318 organisations) response rate. Three (one from main board and two from second board) of the returned questionnaires however were incomplete and were therefore excluded from the analysis. This reduced the response rate to 28.93% (92/318 organisations). As promised, thank-you letters together with a small token from Scotland were mailed to the respondents who had enclosed their business cards with the completed questionnaires. Tables 2 and 3 below present the survey's wave-by-wave returns and response rates.

Table 2

Wave-by-wave returns

WAVES	MAIN BOARD		SECOND BOARD		TOTAL
	CP	IP	CP	IP	
First (20/9/2001 – 3/10/2001)	2	4	1	4	**11**
Second (4/10/2001 – 25/10/2001)	6	10	5	9	**30**
Third (after 26/10/2001)	3	12	16	23	**54**
TOTAL	**11**	**26**	**22**	**36**	**95**
Incomplete	(1)		(2)		(3)
Usable	**36**		**56**		**92**

Table 3

Response to the survey

	MAIN BOARD		SECOND BOARD		TOTAL
	CP	IP	CP	IP	
Questionnaires sent	52	89	54	123	318
Responses	11	26	22	36	95
Response rate (%)	**21.15**	**29.21**	**40.74**	**29.27**	**29.87**

CP = Consumer Products

IP = Industrial Products

The 28.93% response rate in this study is considered reasonably acceptable, as it is within the average rate for the other Malaysian surveys conducted and for most survey researches. As stated by Fowler (1993, p. 40) as,

> Most survey research projects lie somewhere between these two extremes (5% to 95%)

Several response rates for the other recent Malaysian surveys from different areas are listed in the following Table 4.

Table 4

Malaysian surveys

NO.	TITLE AND AUTHORS	RESPONSE RATE (%)
1	Linkage between intensity of competition and use of performance measures in Malaysian manufacturing firms By: Yau, F. S. and Rohani, Z. A. (1999)	30.5%
2	A survey on post-crisis sentiments in Malaysia By: Lin, E. Y. S. (2001)	27%
3	Audit committee: The institutional investor's perpective By: Sori, Z. M., Mohamad, S. and Hamid, M. A. A. (2001b)	20%
4	The importance of non-technical skills in accounting graduates By: Ismail *et al.*, (2001)	29%
5	The effectiveness of the internal auditors in Malaysian listed firms By: Nasser *et al.*, (2001)	39%
6	Audit committee effectiveness: The external auditors' perception By: Sori *et al.*, (2001c)	24%
7	The effectiveness of the audit committee: The chairman's perception By: Sori *et al.*, (2001a)	14.4%

Response bias

Response bias did not appear to be problematic but three procedures were utilized to check response bias (Williams and Seaman, 2002). First the final sample was

dichotomized in terms of size (main and second board) and the descriptive statistics for both were prepared. No significant differences except for the size variable were observed from Table 5. The main board consists of larger organizations, as compared to the second board, and could employ more staff.

Table 5

Main (n = 36) and second (n = 56) boards

Dependent and independent variables descriptive statistics

	MEAN/ *MEDIAN**	STANDARD DEVIATION	RANGE	
			MIN	MAX
Total number of change in MACS				
Main Board	9.11	4.77	0	17
Second Board	9.77	5.35	0	17
***Competition**				
Main Board	2.73	0.64	1	4
Second Board	2.39	0.81	0	4
***Organization structure**				
Main Board	2.35	0.90	0	4
Second Board	2.20	0.99	0	4
Size (no. of employees)				
Main Board	1310	4615	17	28129
Second Board	581	327	125	1568
Organization capacity to learn				
Main Board	16.33	1.62	9	18
Second Board	16.07	2.70	3	19

* 0 = "no effect"; 1 = "little effect"; 2 = "medium effect"; 3 = "strong effect"; 4 = "very strong effect"

Secondly the final sample was divided into two groups according to early and late responses. Completed questionnaires received one month after the first follow-up letters were mailed (on or after 4th November 2001) were considered as late respondents.

Excluding three incomplete questionnaires, there were forty-seven (47) and forty-five (45) early and late respondents, respectively. Again, no significant differences among the descriptive statistics, except on the size variable, were observed between the two groups as shown in Table 6 below.

Table 6

Early (n= 47) and late (n = 45) respondents

Dependent and independent variables descriptive statistics

	MEAN/ *MEDIAN**	STANDARD DEVIATION	RANGE	
			MIN	MAX
Total number of change in MACS				
Early Respondents	10.83	4.68	2	17
Late Respondents	8.18	5.19	0	17
***Competition**				
Early Respondents	2.65	0.609	1.2	4
Late Respondents	2.39	0.88	0	4
***Organization structure**				
Early Respondents	2.33	0.92	0	4
Late Respondents	2.16	0.94	0	4
Size (no. of employees)				
Early Respondents	599	401	17	1568
Late Respondents	1187	4270	26	28129
Organization capacity to learn				
Early Respondents	16.23	2.19	3	19
Late Respondents	16.29	2.25	3	18

* 0 = "no effect"; 1 = "little effect"; 2 = "medium effect"; 3 = "strong effect"; 4 = "very strong effect"

Thirdly, since the main objectives of the questionnaire are to analyse the different management accounting dimensions their frequency percentages were calculated. The Table 7 below shows their pattern.

Table 7

Early (n = 47) and late (n = 45) respondents

Management accounting dimensions and MACS

MANAGEMENT ACCOUNTING CONTROL SYSTEM (MACS)	MANAGEMENT ACCOUNTING CHANGE DIMENSIONS									
	%									
	1		2		3		4		5	
	ER	LR	ER	LR	ER	LR	ER	LR	ER	LR
PLANNING SYSTEMS										
Budgeting	25.5	20	10.6	11.1	46.8	24.4	2.1	8.9	-	-
Operational planning (production)	42.6	17.8	6.4	4.4	36.2	26.7	4.3	11.1	-	-
Capital budgeting	19.1	4.4	12.8	8.9	21.3	22.2	6.4	4.4	-	-
Strategic planning	25.5	22.2	14.9	4.4	17	26.7	12.8	6.7	-	-
Any other planning systems	-	-	-	-	-	-	-	-	-	-
CONTROLLING SYSTEMS										
Performance measurement:										
Individual or team-based	34	20	10.6	4.4	19.1	13.3	6.4	4.4	-	-
Organizational	31.9	17.8	12.8	6.7	14.9	20	10.6	2.2	-	-
Product quality	31.9	20	2.1	13.3	23.4	17.8	14.9	8.9	-	-
Customer service	21.3	15.6	8.5	8.9	21.3	17.8	10.6	13.3	-	-
Any other performance measurement	-	-	-	-	-	-	-	-	-	-
COSTING SYSTEMS										
Direct allocation:										
Manufacturing overhead	19.1	4.4	4.3	8.9	17	26.7	8.5	4.4	-	-
Selling and marketing costs	17	6.7	4.3	11.1	21.3	20	8.5	4.4	-	-
Other overhead (e.g. administration)	17	8.9	4.3	8.9	19.1	22.2	6.4	4.4	-	-
Internal (divisional or department) product transfers	17	1.7	6.4	6.7	10.6	6.7	4.3	4.4	-	-
Any other costing systems	-	-	-	-	-	-	-	-	-	-
DIRECTING SYSTEMS										
Reward systems:										
Bonuses	23.4	8.9	2.1	2.2	12.8	6.7	2.1	4.4	-	-
Pay-for-performance plans	27.7	8.9	2.1	2.2	10.6	6.7	6.4	4.4	-	-
Any other reward systems	2.1	-	2.1	-	-	-	-	-	-	-
DECISION-MAKING SYSTEMS										
Information reported more frequently	27.7	24.4	6.4	8.9	34	26.7	8.5	6.7	-	-
Use of more non-financial measures	29.8	20	6.4	15.6	21.3	15.6	6.4	4.4	-	-
Information reported more broadly	27.7	26.7	8.5	8.9	31.9	24.4	6.4	4.4	-	-
Any other reporting systems	-	-	-	-	-	-	-	-	-	-

ER = Early respondents
LR = Late respondents
1 = Introduction of new techniques as replacement for existing ones
2 = Introduction of new techniques where no management accounting previously existed
3 = Modification in the management accounting information or output
4 = Modification of the technical nature of a management accounting technique or system
5 = Removal of a management accounting technique or systems with no replacement
% = Percentage

Non-response bias

Late respondents were assumed to hold substantially cognate opinions with non-respondents (Brownell, 1995). As cited by Fowler (1993, p. 40) as,

> For mail surveys, bias attributable to non-response can be studied by comparing those who respond immediately with those who respond after follow-up steps are taken. One generalization that seems to hold up for most mail surveys, though it is inferential, is that people who have a particular interest in the subject matter or the research itself are more likely to return mail questionnaires than those who are less interested

The late and non-respondents information was used to test non-respond bias. These groups were split into main and second board for comparative purposes. These groups were dichotomized in terms of turnover, capital employed and number of employees. Only these variables can be gathered from the non-respondent organisations.

Table 8

Main board late (n = 14) and non-respondents (n = 104)

Descriptive statistics

MAIN BOARD	Mean	Standard deviation	Range Min - max
Number of employees			
Late respondents	2,668	7,659	17 – 28,129
Non-respondents	2,239	3,357	2 – 17,395
Turnover			
Late respondents	RM158,881	RM159,791	RM3,360 – RM575,022
Non-respondents	RM714,897	RM1,333,990	RM515 – RM8,301,238
Capital employed			
Late respondents	RM215,818	RM240,745	(RM30,514) - RM871,346
Non-respondents	RM555,013	RM1,101,685	(RM301,570) – RM9,434,911

Table 9

Second board late (n = 31) and non-respondents (n = 119)

Descriptive statistics

SECOND BOARD	Mean	Standard deviation	Range Min - max
Number of employees			
Late respondents	523	287	125 – 1,314
Non-respondents	516	418	1 – 2,282
Turnover			
Late respondents	RM83,228	RM61,234	RM15,707 – RM346,612
Non-respondents	RM86,181	RM86,118	RM5,989 – RM633,073
Capital employed			
Late respondents	RM59,425	RM37,427	(RM29,027) – RM135,113
Non-respondents	RM66,443	RM95,942	(RM331,089) – RM675,342

Tables 8 and 9 show no significant differences among the main and second board late respondents and the non-respondents' descriptive statistics except for the main board's turnover and capital employed. The wider range in the non-respondents' turnover and capital employed variables explained the differences.

3.2.8 Survey Research – Advantages and Disadvantages

Survey, quantitative or macro level research, like all forms of research, however has its advantages and disadvantages. Robson (1993), Denscombe (1998), Punch (1998) and Hakim (2000) summarized the advantages and disadvantages of conducting a survey respectively as follows:

Advantages

1. The emphasis tends to be on producing data based on real-world observations.
2. Surveys lead researchers to find quantitative data that suits their needs.
3. Quantitative data enables standardized, objective comparisons to be made which produces overall descriptions of situations or phenomena in a systematic and comparable way.
4. It can encompass many people or events, involves the idea of a span of vision which is wide and inclusive.
5. Surveys can produce a mountain of data in a short time for a fairly low cost.
6. Certain types of important questions can be systematically answered, opening the way to the development of useful knowledge.

Disadvantages

1. Growing recognition of the limitations of statistical analysis and linear logics for dealing with change processes that involve qualitative change, multiple causation or multiple outcomes. Hence, there is a tendency for significance of the data to become neglected.
2. Data produced is likely to lack much by way of detail or depth on the topic being investigated.
3. The emphasis on wide and inclusive coverage limits the degree to which researchers can check on the accuracy of the responses.

This study was therefore designed to gain the benefits of the survey listed above and also to address the survey limitations by also incorporating a case study.

3.2.9 Case Study Research - Advantages and Disadvantages

Robson (1993, p 146.) defines case study as to be 'a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence'. According to Ryan *et al.*, 1992, p. 370 as,

> ... case studies have an explanatory role and are central to the processes of theory construction and development...

In other words, it good for finding specific, concrete, historically grounded patterns common to small sets of cases. However findings remain particularistic and not general. The types of study discussed in textbooks on qualitative research, from a research design perspective, can be mostly classified as case studies (Hakim, 2000). However Yin (1994, pp. 14 –15) observes that the case study can be based on any mix of quantitative and qualitative evidence.

Qualitative research is more sensitive to context and process, to lived experience and to local groundedness. The researcher tries to get closer to what is being studied. It is normally conducted in a naturalistic setting, so that the context in which the phenomenon occurs is considered to be part of the phenomenon itself (Field and Morse, 1985; Chenhall, 2003). Bryman (1988) described conducting in-depth studies and holistic understanding of the complexity of social life as micro level research. This research can certainly be used for testing hypothesis, theories or even more favoured approaches for theory generation.

Case study, qualitative or micro level research however has advantages and disadvantages. Robson (1993), Densombe (1998), Punch (1998) and Yin (1994) summarized the advantages and disadvantages of conducting a case study as follows:

Advantages

1. A case study allows the researcher to deal with the subtleties and intricacies of complex situations, specifically in getting an insider's perspective.
2. A case study is flexible as it allows the use of a variety of research methods and can be used in a wider range of situations and for a wider range of purposes.
3. It fosters the use of multiple sources of data and in turn, facilitates the validation of data through triangulation.
4. Suitable where researcher has little control over events, there is no pressure on the researcher to impose controls or to change circumstances.
5. Qualitative data has holism and richness and is suited to dealing with the complexity of social phenomena.

Disadvantages

1. The credibility of generalizations made from the case study findings.
2. Case studies are often perceived as producing 'soft' data and this approach gets accused of lacking the degree of rigour expected of social science research.

3. Difficult to define an absolute and clear-cut decision as to what sources of data to incorporate in the case study.
4. Access to documents, people and settings can generate ethical problems in terms of issues such as confidentiality.
5. In case study research that involves protracted involvement over a period of time, there is the possibility that the presence of the researcher can lead to the observer effect (those being researched might behave differently from normal)

It appears that survey and case study are two styles of differing research approach, most obviously in the nature of their data, and in the methods for collecting and analyzing the data. According to Hakim (2000), there is no single type of study inherently inferior or superior to others. Each does a particular job and should be selected according to the nature of the issues or questions to be addressed. In other words, decisions about methods can be governed by the research context, purposes and practicalities as well as by paradigms. It is essential to stress what the research is trying to find out and should be followed by an appropriate method.

Each approach has its strengths and weaknesses and over-reliance on any one method is not appropriate. Both approaches are needed in most social research. There are

connections of each approach to paradigm consideration. As stated by Babbie (1973, p.360),

> Every individual research method carries certain limitations as to the kinds of data, variables and analytical approaches that it permits. Few interesting research problems, however, can adequately be examined within such constraints. Thus survey data should be supplemented with other forms of data whenever appropriate and possible

3.3 SECTION TWO

METHODOLOGICAL TRIANGULATION

According to Fielding and Fielding (1986), triangulation puts the researcher in a frame of mind to regard his or her own material critically by testing it, identifying its weaknesses and deciding whether to test further by doing something different. Bryman (2001) used the term multi-strategy research for research that integrates quantitative and qualitative research within a single project which addresses the same research problem. Methodological triangulation can be classified either as simultaneous or sequential. Simultaneous triangulation is the use of the qualitative and quantitative methods at the same time. Sequential triangulation on the other hand, is used if the results of one method are essential for planning the next method. It could be qualitative followed by quantitative methods or vice-versa. When the notation QUAN → QUAL is used, it indicates a deductive approach. That is, when following the completion of the

quantitative step, a qualitative method is used to examine outliers or to explore unexpected findings (Morse, 1991, p.121).

Methodological triangulation is recommended when a single research method is inadequate, in order to ensure that the most comprehensive approach is taken to solve a research problem. The selection among these methods however depends more on the purposes and circumstances of the research than on philosophical considerations (Punch, 1998).

3.3.1 Value of methodological triangulation

Research results, theory and knowledge development can be strengthened through obtaining complementary findings from method triangulation. Theories are generally the product of quite different traditions, so when they are combined one may get a fuller picture, but not a more 'objective' one. In the same way, different methods have emerged as a product of different theoretical traditions, and therefore combining them can add range and depth, but not accuracy (Fielding and Fielding, 1986).

These different methods would yield different types of data, and taken together, they will provide a more comprehensive understanding of the phenomenon under split study (Chenhall, 2003). For example, confidence in the findings deriving from a study using a

quantitative research strategy can be enhanced by cross-checking against the results of using a method associated with another research strategy (Bryman, 2001).

As stated by Emsley (2001, p. 35),

> The limitations associated with any one research method were reduced because of the multiple method approach which meant that the advantages of one method were, to degree, off-set by the other method ... using multiple method, arguably, enables external validity and internal validity to be maximized ...

Combining two or more studies on an issue will generate a more rounded research design. An initial study may eventually develop a clear view of where this study might lead. So these studies are developed in a logical fashion into the research programme within the permitted circumstances. Combining two or more studies is also needed to fill the gaps between information gathered from each research method. For instance, quantitative and qualitative research are most frequently united where an ethnographer carries out a survey in order to fill some gaps in his or her knowledge of a community, group or organisation, because the gaps cannot be readily filled by a reliance on participant observation or unstructured interviewing alone (Bryman, 1988).

3.3.2 Reasons for adopting methodological triangulation

Survey research is often suggested as a simple way of retrieving information on a large set of organizations. It provides large amounts of data at relatively low cost and in a short period of time. Further, conducting postal survey research is expected to allow anonymity and encourage frankness when sensitive areas are involved (Robson, 1993).

However, despite these merits, there are also several limitations in conducting survey research. First and most importantly, it is generally the case that response rates are poor when respondents are approached by mail. Low response rates may affect the relationships studied in the research question. However, an acceptable 28.93% response rate was achieved in this study and there are no differences of any substance existing between respondents and non-respondents. Secondly, data gathered is affected by the characteristics and perception of respondents. Their memory, knowledge, experience, motivation and personality may influence the data provided. This may also lead to respondents not reporting their actual beliefs or attitudes but by responding in a way that shows them in a good light (Robson, 1993, p. 128). As cited by McClintock *et al.*, 1979, p. 625,

> ...respondents are more likely to give overly rationalized descriptions and to focus on the events that typically receive attention rather than on elusive but important phenomena that are normally the topic of conversation

Thirdly, according to Lukka and Kasanen (1995), no statistical reasoning can assure with any degree of accuracy that the chosen statistical procedure will hold in the future, even using the most sophisticated statistical machinery.

However, statistical analysis and case observation can be combined in a single study to produce powerful results and reasonings. As observed by Lukka and Kasanen (1995, p. 81),

> ... in some research settings statistical analysis and case observations can be combined to make the results even more credible

A case study is usually combined with survey research in an attempt to counterbalance the lack of thoroughness in analysing and interpreting survey results. In other words, the logic and method of survey research can be improved directly or indirectly by a qualitative case study. A theoretical framework or model can be developed from a well-designed survey and act as an essential starting-point which adds to the value of any case study. As cited by Babbie (1973, p. 361) as,

> A researcher might look for the sources of prejudiced views under rigorously controlled experimental conditions, ruling out extraneous variables, and then examine the manner in which the observed effects are represented in the real world.

For example, quantitative data can be used to facilitate the identification of individuals for qualitative study and to delineate representative and unrepresentative cases (Fielding and Fielding, 1986; Bryman, 2001).

3.3.3 How Methodological Triangulation Works

Yin (1994, p. 7) suggests that the first and most important condition for differentiating among the various research strategies is to identify the type of research question being asked. As in this study a management accounting and control systems (MACS) change model (refer to Figure 3) was developed to explain the 'what', 'why' and 'how' of the MACS change process. The five different dimensions of management accounting change and their significance and success ratings will show the components of 'what' type of management accounting change has taken place in the organizations, while the different influential factors will contribute to answering 'why' management accounting change takes place. As suggested by Yin (1994, p.5), these two 'what' and 'why' questions are likely to favour survey strategies.

However, questions relating to 'how' MACS change processes have come about are complex and difficult to be constructed, structured and understood by means of a questionnaire. Case study research seems to be the best additional research methodology that can be adopted to enhance understanding of complexities associated

with answering 'how' MACS change process takes place (Emsley, 2001). As stated by Yin (1994, pp. 20 - 21),

> The case study strategy is most likely to be appropriate for 'how' and 'why' questions, so your initial task is to clarify precisely the nature of your study questions in this regard

Filling the gaps

Aspects that cannot be covered well by means of questionnaire can be captured by a case study (Bryman, 1988). For example, based on the management accounting change literature review there are five different change dimensions and these were adopted by the questionnaire. Similarly, three internal and seven external factors of MACS change were listed in the questionnaire. These lists are not meant to be exhaustive, as an individual organisation may have other MACS change dimensions and influential factors.

As shown by the survey analysis reported in chapters 4 and 5, the identified independent variables, although statistically significant in effect, explained only about 34% of the number of changes in MACS. This shows that about 66% of the number of changes in MACS, are still unexplained. Field and Morse (1985) refer to this stage as the 'maturity concept'. It refers to how much has already been investigated about the topic. Case study is therefore needed to discover other change dimensions, potential

influential factors and the MACS change process. According to Bryman (2001) and Bryman (1988), qualitative research is more processual. Case study is sensitive to context and process as the researcher tries to get closer to what is being studied. Case study aims for in-depth and holistic understanding, in order to do justice to the complexity of social life (Punch, 1998) and appreciate the context in which a single organisation operates in some depth (Otley, 1999).

Inevitably, changes in MACS are also affected by peoples' behaviour. Peoples' behaviour is an important element in any management accounting change process as it may contribute to the change success or failure. Human behaviour can be viewed from a variety of perspectives. Understanding the change process can be derived from direct observation or interview with the appropriate person in the case study organisation who has been involved with the process.

As discovered from the survey analysis, change process in MACS is evolutionary rather revolutionary. It means that most changes are gradual and take time to implement. This further supports the need to include case study research as part of this study's methodological triangulation. In conclusion, case study method is deliberately used to cover contextual conditions which are highly pertinent to the study phenomenon. Survey on the other hand tries to deal with phenomenon and context but its ability to investigate the context is extremely limited (Yin, 1994, p.13).

3.4 SECTION THREE

CASE STUDY SETTING

3.4.1 Objectives

Case study research is conducted in this study to discover the management accounting systems that exist in Minho Bhd. It is also to obtain a better understanding of the change dimension and potential influential factors in Minho Bhd. Identification of the change dimension and the causal factors will explain 'what' and 'why' Minho's management accounting changed, respectively. A combination of these two elements is essential in explaining the changes. Observations during conducting the case study are to support or offer concrete argumentations and value on dubious data produced by the survey. As accounting research is no longer studied in a mode which is divorced from social science and political contexts. Conducting the case study is to get a full picture and better understanding on how management accounting changes have taken placed.

3.4.2 Selection of the case study company

Out of the 95 returned questionnaires, only seven respondents enclosed their business cards. They were sent a thank you letter for completing the survey and were invited to participate in the case study. However only one company, Minho (M) Berhad responded

to this invitation. Mr. Faizal the Finance Manager, on behalf of Minho (M) Bhd agreed to participate in the case study.

The completed and returned questionnaire showed there were significant MACS changes in Minho (M) Bhd during the five year period (1997 – 2001). This company therefore seems suitable for the case study. This criteria is supported by Morse (1991, p.122) as follows,

> ...those subjects included or incidents observed in the qualitative portion must be selected according to the criteria for 'good' participants rather than randomly selected

3.4.3 The methods used in the case study

This case study uses multiple sources of evidence a technique known as data triangulation. Yin (1994, p. 92) stated the advantages of adopting data triangulation as follows,

> Thus any finding or conclusion in a case study is likely to be much more convincing and accurate if it is based on several different sources of information, following a corroboratory mode...With triangulation, the potential problems of construct validity also can be addressed, because the multiple sources of evidence essentially provide multiple measures of the same phenomenon

This suggests that those case studies using multiple sources of evidence are more highly rated in terms of their overall quality, than those which rely only on a single source of information. Several methods are adopted in this case study and these include:

- the use of semi-structured interviews with related staff;
- extensive use of documentary evidence concerning change in management accounting systems;
- observations;
- collection of information on the external context in which the company operated.

3.4.4 Semi-structured interviews

As the objectives of this case study are to discover several aspects of the management accounting change process a range of relevant questions were prepared. Since the topic of the case study is solely on management accounting and control systems, the semi-structured interviews were conducted with people who were related to the creation of and subjected to (information users) the management accounting changes. A number of face-to-face interviews with the group's Finance and Accounts representative, Mr Faizal Abdul Majid the Finance and Accounts Manager and three of his staff were conducted in order to gather information on their existing management accounting

systems and changes therein. An interview was also conducted with Mr Loo Say Leng the Director in charge of several divisions within the company.

All the semi-structured interviews were recorded and transcribed into summary sheets. Immediately after each interview session, a summary sheet was prepared and grouped according to the interviewees' perceptions of management accounting systems changes. These sheets were used to put each documents in context (Miles and Huberman, 1998). These interviews lasted an average of 1 ½ hours each and took place over a period of about 4 months (10 August to 29th November 2002).

The interviews consisted of a semi-structured set of questions. Questions were open-ended in nature and permitted the interviewees to express their own views and emphases. As suggested by Emsley (2001, p. 31),

> Face-to-face interviews were considered the most appropriate medium to gather data ... The open questions enhanced construct validity by ensuring that a manager was focused on the construct associated with each aspect ... Face-to-face interviews enabled the questions to be repeated until such a focus was achieved.

In order to increase internal validity of the case, the interviewees were contacted for follow-up questions and to verify several issues discussed in the earlier interviews. The rapport developed during the face-to-face interviews enabled these inconsistencies to be clarified. Triangulation of data sources and methods was employed. Interviews were checked against documentation provided by interviewees and other written

documentation. The author conducted all the interviews and no attempts were made to lead the interviewees to answer questions, express opinions and statements.

Questions were prepared based on the survey findings conducted on the Malaysian manufacturing listed organizations. Attention was paid to issues which were not well covered in the survey. The objectives and questions are summarized below:

Part one

Questions 1 and 2

These questions were prepared with the intention of obtaining information on the different types of management accounting control systems (MACS) within the organisation. The respondent was guided with the list of five MACS: Planning; Controlling; Costing; Directing; Decision-making and their 23 management sub-systems. Further questions were therefore focused on the existing MACS adopted by the organisation.

Part two

Question 3

The respondent was asked whether any of the listed sub-systems changed during the period of 1997 – 2001 or were still in the changing process. He was reminded of the

Thai currency devaluation that resulted in the Malaysian economic slowdown in mid 1997.

Part three

Question 3

Questions in this part were prepared to get more information on the scope and dimension of MACS changes that have occurred within the organisation. The answers provided contributed to understanding the MACS change dimension/s. As MACS changes can be in different dimensions and phenomenon, this part is expected to explain 'what' change is. This area has lacked focus and explanation by most management accounting researchers as they concentrated more on MACS change as an outcome.

Part four

Questions 4,5,6 &7

Identifying the causal factors that caused the organisation's management accounting systems to change was the objective of this part. Since there are different types of management accounting change, the causal factors of changes are also expected to be numerous. Indeed, management accounting literature and the survey's results (see chapters 4 and 5) confirmed that management accounting changes in practice are due to numerous factors. 34% of the MACS change is explained by the contingency variables

listed in the questionnaire. This implies that 66% of the number of changes in MACS are yet unexplained. As well as the identified macro and micro variables, management accounting change is complex and may include individual motivating factors. The survey is not very suitable in getting feedback on this type of behaviour. It can be better explained through conducting a case study. The case study is therefore expected to uncover some of the other unidentified factors. Overall the discovered causal factors are expected to contribute to answering 'why' management accounting change takes place.

Part five

Question 8

This part is concerned with the whole MACS change process in the case study organisation. The process consists of 'what' change is, 'why' and 'how' the management accounting change has taken place. Only a person who is directly involved in the change process can answer 'how' the system became as it is now. Therefore, direct interviews with appropriate persons are needed. As revealed by the survey, most management accounting changes are incremental or evolutionary rather than revolutionary. Adding, incrementally or even substituting existing management accounting systems in general will take some time. Only by conducting interviews with appropriate persons in the organisation will the management accounting change process that has taken place be revealed.

Part six

Question 9

In addition to getting information on the change process, questions were also prepared on the reasons from any resistance ever faced by the organisation in introducing any management accounting changes.

The case study questions are summarized in Appendix F.

3.4.5 Documentation

Documents are helpful in verifying the issues mentioned in an interview and provide other specific details to corroborate information from other sources (Yin, 1994, p. 81). The following documents were reviewed in this study:

- Management accounting monthly reports
- Budget reports
- Internal audit reports

3.4.6 Observation

By making several field visits to the case study site, this created the opportunity for direct observations. This involved observations in meetings, sidewalk activities throughout the company and its factory.

3.4.7 External Information

Since the case study is a listed company most of the external information was obtained from the Kuala Lumpur Stock Exchange (KLSE). Information regarding the company was gathered from the following sources:

- Quarterly reports;
- Annual financial statements;
- Press releases;
- General or public announcements;
- Financial result announcements;
- Listing circulars;
- Paper cuttings.

CHAPTER FOUR

SURVEY FINDINGS

4.1 INTRODUCTION

STATISTICAL ANALYSIS OF RESULTS

This chapter covers the descriptive statistical analysis of results of the exploratory study conducted on the Malaysian manufacturing organizations. It has four sub-sections. The sections analyse several aspects. These include the subject organisations' background, management function and the number of changes in each of the management accounting control sub-systems. The changes are extended to the five different change dimensions and their significance and success are also reviewed. This section also analyses the degree of influence of external and internal factors on each of the MACS and their correlation with the sub-systems. Finally, this section includes analysis of the possible reasons for management accounting resistance to change.

4.2 SECTION ONE

A REVIEW OF THE BACKGROUND DESCRIPTIVE STATISTICS

As a descriptive foundation for the study, this section outlines the information obtained on the organizations' and the respondents' background and on their management accounting functions. Organisations' backgrounds are multi-dimensional: type of board (stock exchange); type of industry; country of origin; number of years incorporated; annual turnover; capital employed. It is also important to identify the key characteristics of respondents' management accounting function before any management accounting changes are considered.

4.2.1 Organisations' background

Table 10

Type of sample organisations

BOARD (stock exchange)	FREQUENCY	PERCENTAGE (%)
Main	141	44.3
Second	177	55.7
	318	**100**

Table 10 shows that the sample consists of 318 organisations that can be categorized into main (141) and second (177) board organization[2].

Generally, this split is also indicative the size of the 95 organisations that responded. The average response rate was 28.9%. 25.5% (36/141) and 31.6% (56/177) of the main and second board organizations responded, respectively. The sectional breakdown of the responding organisations is shown in Table 11.

Table 11

Type of respondent organisations

BOARD	CONSUMER PRODUCT	%	INDUSTRIAL PRODUCT	%	FREQUENCY	%
Main	10	31.2	26	43.33	36	39.1
Second	22	68.8	34	56.67	56	60.9
	32	**100**	**60**	**100**	**92**	**100**

Table 12 below shows that almost all (95.7%) of the organizations are Malaysian in origin. The remaining are from other Asian countries (i.e. Singapore) and the United Kingdom.

[2] The quantitative requirements that should be fully compiled by the listed main and second board companies depend on their: issued and paid-up share capital; shareholding spread which consist the public shareholdings, their spread and historical profit performance (see Appendix C).

Table 12

Country of origin

	FREQUENCY	PERCENTAGE (%)
Malaysia	88	95.7
Other Asian countries	1	1.0
Others	3	3.3
	92	**100**

Table 13 shows that just under half (44.6%) of the organizations were well established firms as they became companies more than 20 years ago.

Table 13

Number of years incorporated

	FREQUENCY	PERCENTAGE (%)
5 to 10 years	32	34.8
10 to 15 years	5	5.4
15 to 20 years	14	15.2
More than 20 years	41	44.6
	92	**100**

Table 14 shows the annual turnover of responding companies. It shows a considerable spread in size of companies.

Table 14

Annual turnover

	FREQUENCY	PERCENTAGE (%)
Less than RM50,000,000	20	21.7
RM50,000,000 – RM100,000,000	36	39.1
RM100,000,000 – RM150,000,000	15	16.3
RM150,000,000 – RM200,000,000	7	7.6
More than RM200,000,000	14	15.3
	92	**100**

This size (annual turnover) spread is confirmed in Table 15 below which shows the distribution of capital employed in bands.

Table 15

Capital employed

	FREQUENCY	PERCENTAGE (%)
Less than RM50,000,000	20	21.7
RM50,000,000 – RM100,000,000	35	38.0
RM100,000,000 – RM150,000,000	15	16.3
RM150,000,000 – RM200,000,000	8	8.7
More than RM200,000,000	14	15.3
	92	**100**

4.2.2 Individual respondents' background

The questionnaire was addressed to each of the organisations' senior management accountants. However, Table 16 shows that the job titles of respondents vary considerably. While just over half have familiar accounting based titles, just under half (46.7%) have other job titles. These titles included: deputy division manager; senior account manager; general manager; general manager corporate finance; corporate finance manager. This may reflect the wide scope in the modern management accountants' job. As stated by Burns and Vaivio (2001, p. 390),

> The management accountant's role in many organizations has transformed from 'controller' or 'score-keeper' to 'business support' or 'internal business consultant'. For instance, it is not uncommon for management accountants to nowadays be proactively involved in such areas as strategy, information systems implementation and change in management – activities that ten years ago, were unheard of for the vast majority of management accountants

Table 16

Job titles

TITLES	FREQUENCY	PERCENTAGE (%)
Chief Accountant	7	7.6
Accountant	16	17.4
Financial Controller	6	6.5
Finance Manager	17	18.5
Management Accountant	3	3.3
Others	43	46.7
	92	**100**

Table 17 below shows the respondents' length of service (in their present post with their organizations) varies with a clear majority being in past between 5 to 10 years while a substantial majority had been in post for more, than 10 years. A cover letter was enclosed with the questionnaire. It stated that the survey was aimed at any management accounting changes which occurred after 1997 and it was therefore suggested that the questionnaire be best completed by a management accountant who had been in the organisation for not less than 5 years. Although 78.3% of the respondents fell within the first category, this does not imply they are junior staff as it could result from job movements.

Table 17

Length of service

	FREQUENCY	PERCENTAGE (%)
5 – 10 years	72	78.3
More than 10 years	20	21.7
	92	**100**

4.2.3 Respondent management accounting function

This section reviews four different but related aspects of the organizations' management accounting functions: total number of employees in the function; number of qualified management accountants; number of new management accountants; and changes in the person responsible for management accounting function.

Table 18 below shows that the size of organizations studied ranged from small to large in size.

Table 18

Total employees

	FREQUENCY	PERCENTAGE (%)
less than 300	31	33.7
300 to 600	30	32.6
601 to 900	10	10.9
901 to 1,200	8	8.7
More than 1,200	13	14.1
	92	**100**

Most had relatively few qualified staff although almost one-third had more than five qualified management accountants (see Table 19).

Table 19

Number of qualified management accountants

	FREQUENCY	PERCENTAGE (%)
1 to 5	66	71.1
5 to 10	19	20.7
11 to 15	3	3.3
16 to 20	2	2.2
More than 20	2	2.2
	92	**100**

Changes in management accounting staffing tended to be limited in scale. 89% of the organizations had employed less than five new management accountants in the preceding five year period.

Table 20

Number of new management accountants

	FREQUENCY	PERCENTAGE (%)
1 to 5	82	89.1
5 to 10 years	10	10.9
More than 10	-	-
	92	**100**

However one influential change in management staffing was apparent. Table 21 shows that the clear majority of firms had changed the person responsible for the management accounting function within the last five years.

Table 21

Change in the person responsible for management accounting function

	FREQUENCY	PERCENTAGE (%)
Yes	58	63
No	34	37
	92	**100**

4.3 SECTION TWO

MANAGEMENT ACCOUNTING CHANGE DIMENSIONS

4.3.1 Measures

Changes in management accounting control system (MACS) can take several forms. This study has categorized MACS change into five different types which may aid analysis of change sensitivity to the independent variables. These are:

1. Introduction of new techniques as replacement for existing ones
2. Introduction of new techniques where no management accounting previously existed
3. Modification in the management accounting information or output
4. Modification of the technical nature of a management accounting technique or system
5. Removal of a management accounting technique or system with no replacement

A listing of these dimensions is provided in the questionnaire using a number reference ranging from 0 (no change) to 5 (removal of a management accounting technique or system with no replacement). Respondents were required to indicate the type of change occurring for each of the 23 sub-systems in the last 5 years (1997 – 2001 inclusive).

Further aspects of the nature of the changes experienced were ascertained by asking respondents to rate the overall significance and success of each of the five types of MACS change in their organization. A three-point scale was used to indicate the significance (Low significance, Significant, High significance) and the success (Unsuccessful, Moderately successful, Unsuccessful) levels of each type of change.

4.3.2 Results: Overall change

Table 22

MACS frequency (n = 92)

MACS main components	Total number of changes	%	Total number of no changes	%	Total systems exist	(%)
Planning	241	27.5	117	19.1	358	24.0
Controlling	221	25.3	134	21.9	355	23.8
Costing	162	18.5	181	29.5	343	23.0
Directing	60	6.9	108	17.6	168	11.3
Decision-making	191	21.8	73	11.9	264	17.7
TOTAL	**875**	**100**	**613**	**100**	**1488**	**100**

The above Table 22 shows that most changes are in the planning (27.5%), controlling (25.3%), decision-making (21.8%) and costing (18.5%) systems. Directing systems (6.9%) have a markedly lower volume of changes. The relative propensity of a system

to change is indicated by expressing the actual changes as a percentage of the total systems in existence. This was as follows: decision-making (72%), planning (67%), controlling (62%), costing (47%) and directing (36%) systems. This analysis is only concerned with changes per se and does not reflect the different change dimensions. The incorporation of the various change dimensions and the analysis is undertaken below.

4.3.3 Results: Change dimensions

Table 23 below is based on the five dimensions of management accounting systems change used in this study. The most common dimensions of change are the 'Modification in the management accounting information or output' accounting for 37.3% of changes and 'Introduction of new techniques as replacement for existing ones' accounting for 37.1% of changes. 'Introduction of new techniques where no management accounting previously existed' and 'Modification of the technical nature of a management accounting technique or system' change types were relatively low at 13.9% and 11.7% of changes, respectively. There was nil in the category for 'Removal of a management accounting technique or systems with no replacement'.

'Modification in the management accounting information or outputs' involves using existing management accounting systems but amending their information outputs, for example, more variance analysis being included in the budget and performance reports.

These changes were a substantial proportion of all change in the management accounting and control sub-systems categories (ranging from 28% to 42% of sub-system changes). 'Introduction of new techniques as replacement for existing ones' was similarly important throughout the sub-systems (ranging from 30% to 55% of sub-system changes). 'Introduction of new techniques where no management accounting previously existed' and 'Modification of the technical nature of a management accounting technique or system' were relatively evenly spread across the management accounting and control sub-systems but were considerably less prominent (varying from 8% to 15% of the sub-system changes).

The responses indicate that removal of management accounting without replacement has been non-existent. Change therefore builds on the existing system which most commonly is altered by the replacement of part of the system or the modification of information outputs from continuing systems. Further change (though markedly smaller in volume) is apparent in the introduction of new techniques to add to system capacity and the modification of the nature of management accounting.

Table 23

Management accounting change dimensions and MACS (n = 92)

MANAGEMENT ACCOUNTING CONTROL SYSTEM (MACS)	MANAGEMENT ACCOUNTING DIMENSIONS											
	1		2		3		4		5		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%
PLANNING SYSTEMS												
Budgeting	21	30.9	10	14.7	32	47.1	5	7.3	-	-	**68**	**28.2**
Operational planning (production)	27	39.7	5	7.4	29	42.6	7	10.3	-	-	**68**	**28.2**
Capital budgeting	11	23.9	10	21.7	20	43.5	5	10.9	-	-	**46**	**19.1**
Strategic planning	21	35.6	9	15.3	20	33.9	9	15.2	-	-	**59**	**24.5**
Any other planning systems	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL CHANGES	**80**	**33.2**	**34**	**14.1**	**101**	**41.9**	**26**	**10.8**	**-**	**-**	241	100
CONTROLLING SYSTEMS												
Performance measurement:												
Individual or team-based	25	48.1	7	13.5	15	28.8	5	9.6	-	-	**52**	**23.5**
Organizational	23	42.6	9	16.7	16	29.6	6	11.1	-	-	**54**	**24.4**
Product quality	24	39.3	7	11.5	19	31.1	11	18.1	-	-	**61**	**27.7**
Customer service	17	31.5	8	14.8	18	33.3	11	20.4	-	-	**54**	**24.4**
Any other performance measurement	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL CHANGES	**89**	**40.3**	**31**	**14.3**	**68**	**30.8**	**33**	**14.6**	**-**	**-**	221	100
COSTING SYSTEMS												
Direct allocation:												
Manufacturing overhead	12	26.7	6	13.3	21	46.7	6	13.3	-	-	**45**	**27.7**
Selling and marketing costs	12	27.3	7	15.9	19	43.2	6	13.6	-	-	**44**	**27.2**
Other overhead (e.g. administration)	13	30.2	6	14.0	19	44.2	5	11.6	-	-	**43**	**26.5**
Internal (divisional or department) product transfers	12	40.0	6	20.0	8	26.7	4	13.3	-	-	**30**	**18.6**
Any other costing systems	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL CHANGES	**49**	**30.2**	**25**	**15.4**	**67**	**41.4**	**21**	**13.0**	**-**	**-**	162	100
DIRECTING SYSTEMS												
Reward systems:												
Bonuses	15	51.7	2	6.9	9	31.0	3	10.4	-	-	**29**	**48.3**
Pay-for-performance plans	17	58.6	2	6.9	8	27.6	2	6.9	-	-	**29**	**48.3**
Any other reward systems	1	50.0	1	50.0	-	-	-	-	-	-	**2**	**3.4**
TOTAL CHANGES	**33**	**55.0**	**5**	**8.3**	**17**	**28.3**	**5**	**8.4**	**-**	**-**	60	100
DECISION-MAKING SYSTEMS												
Information reported more frequently	25	36.8	7	10.3	29	42.6	7	10.3	-	-	**68**	**35.6**
Use of more non-financial measures	23	41.2	11	19.6	17	30.4	5	8.8	-	-	**56**	**29.3**
Information reported more broadly	26	38.8	9	13.4	27	40.3	5	7.5	-	-	**67**	**35.1**
Any other reporting systems	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL CHANGES	**74**	**38.7**	**27**	**14.1**	**73**	**38.2**	**17**	**9.0**	**-**	**-**	191	100
MACS TOTAL CHANGES	**325**	**37.1**	**122**	**13.9**	**326**	**37.3**	**102**	**11.7**	**-**	**-**	875	100

1 = Introduction of new techniques as replacement for existing ones
2 = Introduction of new techniques where no management accounting previously existed
3 = Modification in the management accounting information or output
4 = Modification of the technical nature of a management accounting technique or system
5 = Removal of a management accounting technique or systems with no replacement
F = Frequency
% = Percentage

4.3.4 Results: MACS change significance and success

In addition to analyzing the volume of management accounting changes and the different change dimensions, this study also explores the significance and success of the changes. Three Likert point-scales were used to explore the significance levels (low; significant; high) and success levels (unsuccessful; moderately successful; very successful). The term 'not applicable' was used for those not responding to this part who were unsure of the significance and success of the management accounting change.

Table 24 (i)

MACS changes significant levels

SIGNIFICANCE LEVELS	PLANNING		CONTROL-LING		COST-ING		DIRECT-ING		DECISION MAKING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%
Low significance	6	6.5	7	7.5	5	5.4	4	4.3	4	4.3	26	5.6
Significance	46	50.0	40	44.1	34	37.0	22	23.9	55	59.8	197	42.8
High significance	9	9.8	5	5.4	3	3.3	5	5.4	2	2.2	24	5.2
Not applicable	31	33.7	40	43.0	50	54.3	61	66.3	31	33.7	213	46.4
TOTAL		**100**		**100**		**100**		**100**		**100**	**460**	**100**
Average rating*		**2.0**		**2.0**		**2.0**		**2.0**		**2.0**		

Table 24 (ii)

MACS changes success levels

SUCCESS LEVELS	PLANNING		CONTROL-LING		COST-ING		DIRECT-ING		DECISION MAKING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%
Unsuccessful	1	1.1	1	1.1	-	-	1	1.1	1	1.1	4	0.9
Moderate success	57	62.0	50	54.3	34	37	24	26.1	52	56.5	217	47.2
Very successful	13	14.1	7	7.6	9	9.8	6	6.5	10	10.9	45	9.9
Not applicable	21	22.8	34	37.0	49	53.3	61	66.3	29	31.5	194	42.0
TOTAL		**100**		**100**		**100**		**100**		**100**	**460**	**100**
Average rating*		**3.0**		**2.1**		**2.2**		**2.2**		**2.1**		

Table 24(i) and (ii) show that overall the changes were rated both significant (average rating 2.0) and successful (average rating 2.0). This was consistent across all management accounting and control sub-systems. The higher than normal success rating (3.0) in planning is notable. However, this study does not study the significance and success of each of the five different change dimensions.

4.4 SECTION THREE

INFLUENTIAL FACTORS

The literature review (chapter, pp. 19 - 40) provides evidence that management accounting control systems change in response to a variety of factors. These factors can be broadly categorized as external and internal to the organization. External factors reflect the environment in which the organization is operating. Prior research suggests they are grouped into three categories:

1. Competition
2. Market
3. Consumers

Internal factors are the micro-organisational factors causing and influencing management accounting change within the organizational. Prior research (see literature review, chapter, pp. 30 - 41) suggests that they can be grouped under seven headings. They are as follows:

1. Organizational structure
2. Managerial policies
3. Cost structure
4. Production technology

5. Problem of existing techniques
6. Employees
7. Deterioration of financial performance

Examples for each of these factors are included in the questionnaire (refer to Appendix B) and the nature of each in reviewed in chapter 2.

4.4.1 Measures

Respondents were asked to rate their perception of the influence of all the external and internal factors on each MACS sub-systems: Planning; Controlling; Costing; Directing; and Decision-making. A five-point scale ranging from 'no effect' to 'very strong effect' was used. To aid and standardize intercorrelation, examples of each factor were included with the objective of giving the same scope for each of the influential factors.

4.4.2 External factors

The topics listed in the questionnaire to exemplify and explain each of the external factors were as follows: quality improvement, cost minimization, international competition, lower cost technology and waste reduction were used to exemplify and explain competition. The next external factor market, comprised key components of the circumstances in which an organization operates. Organization activities and policies on

its product quality, delivery, flexibility and designs reflect its market reputation. The impact of the consumer on the organizational activities and policies may occur in several ways. These include the need for product innovation to fulfill customers' demand and to minimise dissatisfied customers.

4.4.3 External factors influence on each MACS

The following Table 25 summarizes the respondents' perceptions of each of the external factors on each of the MACS sub-systems: Planning; Controlling; Costing; Directing; and Decision-making. A five point Likert scale was used in this study from 'no effect' to 'very strong effect'. According to the responses in all systems, all the three external factors appear to strongly influence (above the average ratio, 2.0) changes with small deviation from the mean (less than 1.0).

Table 25

External factors and influence levels on each MACS (n = 92)

INFLUENCE LEVELS	COMPETITION											
	PLAN-NING		CONTROLLING		COSTING		DIRECTING		DECISION MAKING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%
No effect	5	5.4	3	3.3	5	5.4	3	3.3	2	2.2	18	3.9
Little effect	6	6.5	10	10.9	4	4.3	10	10.9	2	2.2	32	6.9
Medium effect	23	25.0	33	35.9	26	28.3	40	43.5	23	25.0	145	31.5
Strong effect	49	53.3	39	42.4	43	46.7	36	39.1	54	58.7	221	48.0
Very strong effect	9	9.8	7	7.6	14	15.2	3	3.3	11	12.0	44	9.7
		100		**100**		**100**		**100**		**100**	**460**	**100**
Mean *		**2.55**		**2.40**		**2.62**		**2.28**		**2.76**		
Standard deviation*		**0.95**		**0.90**		**0.98**		**0.83**		**0.78**		

INFLUENCE LEVELS	MARKET											
	PLANNING		CONTROLLING		COSTING		DIRECTING		DECISION MAKING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%
No effect	2	2.2	2	2.2	3	3.3	2	2.2	2	2.2	11	2.4
Little effect	7	7.6	9	9.8	8	8.7	10	10.9	5	5.4	39	8.5
Medium effect	27	29.3	37	40.2	33	35.9	40	43.5	25	27.2	162	35.2
Strong effect	45	48.9	36	39.1	37	40.2	34	37.0	53	57.6	205	44.6
Very strong effect	11	12.0	8	8.7	11	12.0	6	6.5	7	7.6	43	9.3
		100		**100**		**100**		**100**		**100**	**460**	**100**
Mean*		**2.61**		**2.42**		**2.49**		**2.35**		**2.63**		
Standard deviation*		**0.88**		**0.87**		**0.93**		**0.84**		**0.79**		

INFLUENCE LEVELS	CONSUMER											
	PLANNING		CONTROLLING		COSTING		DIRECTING		DECISION MAKING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%
No effect	2	2.2	2	2.2	3	3.3	4	4.3	2	2.2	13	2.8
Little effect	11	12.0	11	12.0	10	10.9	11	12.0	7	7.6	50	10.9
Medium effect	30	32.6	41	44.6	30	32.6	31	33.7	30	32.6	162	35.2
Strong effect	43	46.7	34	37.0	39	42.4	43	46.7	47	51.1	206	44.8
Very strong effect	6	6.5	4	4.3	10	10.9	3	3.3	6	6.5	29	6.3
		100		**100**		**100**		**100**		**100**	**460**	**100**
Mean*		**2.43**		**2.29**		**2.47**		**2.33**		**2.52**		
Standard deviation*		**0.87**		**0.82**		**0.94**		**0.89**		**0.82**		

However analyzing the above Table 25 does not explain the degree of the relationship between these three external factors and the number of changes in MACS.

4.4.4 External factors correlations

Table 26 below shows correlations between the changes in MACS and each of the external factors. The independent variables seem to generally have a highly significant correlation with change in MACS. There are positive and significant correlations between the number of changes in MACS and competition ($r = 0.336$, $p < 0.01$), market ($r = 0.379$, $p < 0.01$) and consumer ($r = 0.335$, $p < 0.01$). This supports the above analysis which suggests that all three independent external factors have significantly

influenced change in the MACS. Relationships between these variables indicate that MACS change more in organizations that are exposed to a dynamic market environment, are concerned with their capacity to meet consumer needs and which experience a high degree of competition. Evidence shown by these relationships suggest these three independent variables will be part of a MACS change multiple regression model.

Table 26

Correlations between number of changes in MACS and the external factors (n=92)

	Variable	1
1.	Number of changes in MACS	NA
2.	Competition	0.336**
3.	Market	0.379**
4.	Consumer	0.335**

*p < 0.05

**p < 0.01

The following Pearson correlation matrix shows a more detailed correlation analysis between the three external factors and changes in each management accounting control sub-systems.

Table 27

Pearson correlation matrix

External factors and changes in management accounting and control sub-systems

	EXTERNAL FACTORS		
	COMPETITION	MARKET	CONSUMER
PLANNING SYSTEMS			
Budgeting	0.295**	0.155	0.112
Operations planning (production)	0.255*	0.234*	0.090
Capital budgeting	0.288**	0.284**	0.264*
Strategic planning	0.286**	0.248*	0.304**
Others	a	a	a
CONTROLLING SYSTEMS			
Performance measurement:			
Individual or team-based	0.237*	0.128	0.081
Organisational	0.190	0.144	0.108
Product quality	0.346**	0.345**	0.264*
Customer service	0.272*	0.281**	0.189
Others	-0.054	0.02	-0.39
COSTING SYSTEMS			
Direct allocation:			
Manufacturing overhead	0.285**	0.330**	0.298**
Selling and marketing costs	0.256*	0.344**	0.325**
Other overhead (e.g. administration)	0.232*	0.305**	0.199
Internal (divisional or dept) product transfer	0.141	0.153	0.150
Others	a	a	a
DIRECTING SYSTEMS			
Reward systems:			
Bonuses	0.199	0.177	0.132
Pay-for-performance plans	0.179	0.183	0.145
Other reward systems	-0.155	-0.084	-0.132
DECISION-MAKING SYSTEMS			
Information reported more frequently	0.273**	0.343**	0.281**
Use of more non-financial measures	0.003	0.026	0.059
Information reported more broadly	0.127	0.096	0.098
Others	a	a	a

*$p < 0.05$
**$p < 0.01$

These three external factors have significant correlation with just under half of the specific types of information comprising MACS. Competition has strong correlations with mostly all the sub-systems. Market has a strong correlation with the planning, controlling and costing systems. Consumer orientation has a strong correlation with selected planning and costing sub-systems. There is little correlation between these factors and all the directing sub-systems. Overall, therefore their influence appears most marked for planning, controlling, costing sub-systems and the frequency of information for decision making.

4.4.5 Internal factors influence on MACS

This section presents and analyses the influence of internal factors on each MACS sub-system: Planning; Controlling; Costing; Directing; and Decision-making. Internal factors are those that exist within the organization. From the literature review seven internal factors were identified and grouped into the following classifications: organizational structure; managerial policies; cost structure; production technology; problems of existing techniques; employees; deterioration of financial performance. Examples for each factor were stated in the questionnaire to facilitate responses and minimize differences in perceptions that might have arisen among respondents.

4.4.6 Internal factors correlation

The following Table 28 demonstrates the respondents' perceptions of the influence of each of the internal factors on each MACS sub-systems: Planning, Controlling, Costing, Directing and Decision-making systems. A five point Likert scale was used in this study from 'no effect' to 'very strong effect'. Any of the influential factors that is not applicable to the respondent organisation, was referred to as 'not applicable'.

Table 28

Internal factors influence on each MACS (n = 92)

INFLUENCE LEVELS	ORGANISATIONAL STRUCTURE											
	PLANNING		CONTROLLING		COSTING		DIRECTING		DECISION MAKING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%
No effect	4	4.3	4	4.3	7	7.6	4	4.3	5	5.4	24	5.2
Little effect	14	15.2	13	14.1	20	21.7	14	15.2	10	10.9	71	15.4
Medium effect	34	37.0	31	33.7	40	43.5	39	42.4	37	40.2	181	39.3
Strong effect	28	30.4	33	35.9	18	19.6	28	30.4	27	29.3	134	29.1
Very strong effect	11	12.0	10	10.9	6	6.5	6	6.5	12	13.0	45	9.8
Not applicable	1	1.1	1	1.1	1	1.1	1	1.1	1	1.1	5	1.2
		100		**100**		**100**		**100**		**100**	**460**	**100**
Mean *		**2.3**		**2.4**		**2.0**		**2.2**		**2.4**		
Standard deviation*		**1.1**		**1.0**		**1.0**		**1.0**		**1.1**		

INFLUENCE LEVELS	MANAGERIAL POLICIES											
	PLANNING		CONTROLLING		COSTING		DIRECTING		DECISION MAKING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%
No effect	2	2.2	3	3.3	5	5.4	3	3.3	4	4.4	17	3.7
Little effect	13	14.1	12	13.0	15	16.3	12	13.0	10	11.0	62	13.5
Medium effect	27	29.3	30	32.6	35	38.0	39	42.4	26	28.6	157	34.1
Strong effect	38	41.3	39	42.4	29	31.5	31	33.7	40	42.8	177	38.5
Very strong effect	11	12.0	7	7.6	7	7.6	6	6.5	11	12.1	42	9.1
Not applicable	1	1.1	1	1.1	1	1.1	1	1.1	1	1.1	5	1.1
		100		**100**		**100**		**100**		**100**	**460**	**100**
Mean *		**2.5**		**2.4**		**2.2**		**2.3**		**2.5**		
Standard deviation*		**1.0**		**1.0**		**1.0**		**0.9**		**1.0**		

INFLUENCE LEVELS	COST STRUCTURE											
	PLANNING		CONTROLLING		COSTING		DIRECTING		DECISION MAKING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%
No effect	3	3.3	3	3.3	3	3.3	5	5.4	3	3.3	17	3.7
Little effect	6	6.5	8	8.8	6	6.5	7	7.6	5	5.4	32	6.9
Medium effect	33	35.9	39	41.7	34	37.0	42	45.7	32	34.8	180	39.1
Strong effect	39	42.4	30	33.0	35	38.0	33	35.9	41	44.6	178	38.7
Very strong effect	10	10.9	11	12.1	13	14.1	4	4.3	10	10.9	48	10.5
Not applicable	1	1.1	1	1.1	1	1.1	1	1.1	1	1.1	5	1.1
		100		**100**		**100**		**100**		**100**	**460**	**100**
Mean *		**2.5**		**2.4**		**2.6**		**2.3**		**2.6**		
Standard deviation*		**0.9**		**1.0**		**1.0**		**0.9**		**0.9**		

INFLUENCE LEVELS	PRODUCTION TECHNOLOGY											
	PLANNING		CONTROLLING		COSTING		DIRECTING		DECISION MAKING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%
No effect	5	5.4	5	5.4	5	5.4	7	7.6	5	5.4	27	5.9
Little effect	11	12.0	11	12.0	10	10.9	11	12.0	10	10.9	53	11.5
Medium effect	34	37.0	33	35.9	40	43.5	44	47.8	36	39.1	187	40.7
Strong effect	31	33.7	32	34.8	27	29.3	22	23.9	31	33.7	143	31.1
Very strong effect	8	8.7	8	8.7	7	7.6	5	5.4	7	7.6	35	7.6
Not applicable	3	3.3	3	3.3	3	3.3	3	3.3	3	3.3	15	3.2
		100		**100**		**100**		**100**		**100**	**460**	**100**
Mean *		**2.4**		**2.4**		**2.3**		**2.2**		**2.4**		
Standard deviation*		**0.9**		**1.1**		**1.1**		**1.1**		**1.1**		

INFLUENCE LEVELS	PROBLEMS OF EXISTING TECHNIQUES											
	PLANNING		CONTROLLING		COSTING		DIRECTING		DECISION MAKING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%
No effect	3	3.3	3	3.3	3	3.3	4	4.3	4	4.3	17	3.7
Little effect	21	22.8	20	21.7	20	21.7	24	26.1	16	17.4	101	21.9
Medium effect	32	34.8	38	41.3	42	45.7	35	38.0	38	41.3	185	40.2
Strong effect	25	27.2	23	25.0	21	22.8	23	25.0	24	26.1	116	25.2
Very strong effect	8	8.7	5	5.4	3	3.3	3	3.3	8	8.7	27	5.9
Not applicable	3	3.3	3	3.3	3	3.3	3	3.3	2	2.2	14	3.1
		100		**100**		**100**		**100**		**100**	**460**	**100**
Mean *		**2.3**		**2.2**		**2.1**		**2.1**		**2.2**		
Standard deviation*		**1.1**		**1.1**		**1.0**		**1.0**		**1.1**		

INFLUENCE LEVELS	EMPLOYEES											
	PLANNING		CONTROLLING		COSTING		DIRECTING		DECISION MAKING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%
No effect	4	4.3	4	4.3	4	4.3	4	4.3	5	5.4	21	4.6
Little effect	15	16.3	14	15.2	16	17.4	15	16.3	16	17.4	76	16.5
Medium effect	29	31.5	33	35.9	38	41.3	38	41.3	30	32.6	168	36.5
Strong effect	33	35.9	35	38.0	29	31.5	30	32.6	32	34.8	159	34.6
Very strong effect	9	9.8	4	4.3	3	3.3	3	3.3	8	8.7	27	5.9
Not applicable	2	2.2	2	2.2	2	2.2	2	2.2	1	1.1	9	1.9
		100		**100**		**100**		**100**		**100**	**460**	**100**
Mean *		**2.4**		**2.3**		**2.2**		**2.2**		**2.3**		
Standard deviation*		**1.1**		**1.0**		**1.0**		**1.0**		**1.1**		

INFLUENCE LEVELS	DETERIORATION OF FINANCIAL PERFORMANCE											
	PLANNING		CONTROLLING		COSTING		DIRECTING		DECISION MAKING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%
No effect	3	3.3	3	3.3	4	4.3	4	4.3	3	3.3	17	3.7
Little effect	10	10.9	10	10.9	6	6.5	9	9.8	8	8.7	43	9.3
Medium effect	30	32.6	31	33.7	33	35.9	36	39.1	28	30.4	158	34.3
Strong effect	37	40.2	36	39.1	34	37.0	33	35.9	41	44.6	181	39.3
Very strong effect	10	10.9	10	10.9	13	14.1	8	8.7	11	12.0	52	11.3
Not applicable	2	2.2	2	2.2	2	2.2	2	2.2	1	1.1	9	2.1
		100		**100**		**100**		**100**		**100**	**460**	**100**
Mean *		**2.5**		**2.5**		**2.6**		**2.4**		**2.6**		
Standard deviation*		**1.0**		**1.0**		**1.0**		**1.0**		**1.0**		

* based on five point Likert scale: 0 = no effect; 1 = little effect; 2 = medium effect; 3 = strong effect; 4 = very strong effect

According to the responses, all the seven internal factors appear to strongly influence (above than the average ratio, 2.0) changes with standard deviation of about 1.0 in all the systems. The organizational design or structure, managerial policies, production technology adopted and problems arising from the existing techniques seem to mostly influence changes in the planning, controlling and decision-making systems. This study also shows that employees' knowledge strongly influences change in most of these three systems. Organizations that continually re-evaluate their cost structures need to frequently modify their costing and decision-making systems. In order to support these, management accounting measures that were barriers to continuous improvement have to be removed. This is supported by Table 28 which shows that deteriorating financial performance causes more new measures to be replaced and introduced in the costing and decision-making systems. Among the five MACSs, the directing system is the least influenced by all the seven influential factors.

However analyzing the above Table 28 does not explain the degree of the relationship between these seven internal factors and the number of changes in MACS.

Table 29 below shows correlations between the number of changes in MACS and each of the internal factors. All the independent variables, except problems of existing techniques, seem to generally have a highly significant correlation with the number of changes in MACS. For example, there is a strong positive correlation between organizations structure and number of changes in MACS ($r = 0.286$, $p < 0.01$).

Relationships between these variables indicate that MACS change depends on the different types of organizational design adopted. For example, choice or change in organizational structure might result in a change in budgetary control systems. However management accounting change due to organisational structure is 'incomplete' without relating it to organisational managerial activities and policies. Organisations with continuous improvement in activities and policies require relevant information for the organisation to plan, manage and control. Cost-conscious organizations are also likely to demand frequent changes in management accounting. They are concerned specifically with the identification and accumulation of cost which provides much of the basic information required in planning, decision-making and control.

The table also shows that organisations which adopt new and high technology manufacturing techniques can experience higher levels of changes in MACS. The study also indicates that MACS change can be initiated by the organisation's employees. Most employees have been exposed to different MACS techniques through their previous jobs, their education, attending seminars or reading published materials.

The evidence shown of these relationships suggest these independent variables are a part of the changes in MACS multiple regression.

Table 29

Correlations between number of changes in MACS and the internal factors (n=92)

Variable	1
1. Number of changes in MACS	NA
2. Organisation structure	0.286**
3. Managerial policies	0.297**
4. Cost structure	0.286**
5. Production technology	0.321**
6. Problems of existing techniques	0.201
7. Employees	0.279**
8. Deterioration of financial performance	0.316**

**$p < 0.01$

The following Table 30 will show a more thorough correlation analysis between the seven internal factors and changes in each of the 23 management accounting control sub-systems.

Table 30

Pearson correlation matrix

Internal factors and changes in management accounting and control sub-systems

MANAGEMENT ACCOUNTING AND CONTROL SUB-SYSTEMS	INTERNAL FACTORS		
	ORGANISATION STRUCTURE	MANAGERIAL POLICIES	COST STRUCTURE
PLANNING SYSTEMS			
Budgeting	0.111	0.145	0.111
Operations planning (production)	0.185	0.220*	0.185
Capital budgeting	0.229*	0.233*	0.229*
Strategic planning	0.194	0.219*	0.194
Others	a	a	a
CONTROLLING SYSTEMS			
Performance measurement:			
Individual or team-based	0.050	0.121	0.050
Organisational	0.030	0.061	0.030
Product quality	0.110	0.199	0.170
Customer service	0.118	0.109	0.118
Others	-0.138	-0.187	-0.138
COSTING SYSTEMS			
Direct allocation:			
Manufacturing overhead	0.245*	0.277**	0.289**
Selling and marketing costs	0.289**	0.277**	0.289**
Other overhead (e.g. administration)	0.155	0.117	0.155
Internal (divisional or dept) product transfer	0.216*	0.137	0.216*
Others	a	a	a
DIRECTING SYSTEMS			
Reward systems:			
Bonuses	0.076	0.136	0.076
Pay-for-performance plans	0.114	0.070	0.114
Other reward systems	-0.085	-0.140	-0.085
DECISION-MAKING SYSTEMS			
Information reported more frequently	0.268**	0.255*	0.268**
Use of more non-financial measures	-0.026	0.037	-0.026
Information reported more broadly	0.028	0.027	0.028
Others	a	a	a

*p < 0.05; **p < 0.01

Table 30

Pearson correlation matrix

Internal factors and changes in management accounting and control sub-systems

(cont'd)

MANAGEMENT ACCOUNTING AND CONTROL SUB-SYSTEMS	INTERNAL FACTORS			
	PRODUCTION TECHNOLOGY	PROBLEMS OF EXISTING TECHNIQUES	EMPLOYEES	DETERIORATION OF FINANCIAL PERFORMANCE
PLANNING SYSTEMS				
Budgeting	-0.007	-0.079	-0.063	0.059
Operations planning (production)	0.164	0.104	-0.022	0.121
Capital budgeting	0.262*	0.087	0.075	0.193
Strategic planning	0.226*	0.051	0.063	0.157
Others	a	a	a	a
CONTROLLING SYSTEMS				
Performance measurement:				
Individual or team-based	0.129	-0.055	-0.051	-0.005
Organisational	0.099	-0.142	-0.631	-0.005
Product quality	0.133	-0.077	-0.175	0.029
Customer service	0.181	-0.128	-0.127	-0.003
Others	-0.1	-0.144	-0.134	-0.048
COSTING SYSTEMS				
Direct allocation:				
Manufacturing overhead	0.187	0.018	-0.078	0.129
Selling and marketing costs	0.273*	0.107	0.015	0.175
Other overhead (e.g. administration)	0.205*	0.063	-0.114	0.097
Internal (divisional or dept) product transfer	0.407**	0.185	0.023	0.210*
Others	a	a	a	a
DIRECTING SYSTEMS				
Reward systems:				
Bonuses	0.128	-0.045	-0.106	-0.002
Pay-for-performance plans	0.106	-0.058	-0.120	-0.021
Other reward systems	-0.065	-0.124	-0.083	-0.033
DECISION-MAKING SYSTEMS				
Information reported more frequently	0.216*	-0.029	-0.006	0.176
Use of more non-financial measures	0.056	-0.123	-0.127	0.005
Information reported more broadly	-0.021	-0.201	-0.225*	-0.097
Others	a	a	a	a

*p < 0.05, **p < 0.01

Table 30 demonstrates the correlation between the seven internal factors and changes in the management accounting sub-systems. The first part of Table 30 (page 179) contains three of the internal factors: organisational structure; managerial policies; cost structure. Organisational structure is significantly positively related to changes in capital budgeting, allocation of manufacturing, selling and marketing cost, internal product transfer sub-systems and more frequently reported decision-making information. Managerial policies significantly and positively influence changes in all planning sub-systems except the budgeting system, while changes in manufacturing, other, selling and marketing cost allocation and the frequency of decision-making information reported are also highly positively associated with the policies and activities adopted by the organisation.

The second part of Table 30 (page 180) covers the remaining four internal factors: production technology; problems of existing techniques; employees; and deterioration of financial performance. Production technology is significantly related to changes in capital budgeting, strategic planning and selling and marketing cost allocation and internal product transfer sub-systems. The remaining internal factors seem to be less significantly related to the 23 management accounting sub-systems changes. However, two significant relationships were notable from these three influential factors. Employees are significantly negatively related to changes in decision-making information reported more broadly, while, deterioration of financial performance is

significantly positively associated to changes in the internal or divisional product transfer sub-system.

4.5 SECTION FOUR

MANAGEMENT ACCOUNTING CHANGE RESISTANCE

4.5.1 Measures

The literature review has shown that there are also several factors which cause resistance to management accounting change in organisations. Resistance to change exists when the members of the organisation contest the management accounting change and so create barriers or hurdles to the change. Previous studies on management accounting processes demonstrate several causes of resistance to management accounting change in an organisation. From an analysis of this work seven major reasons for resistance to management accounting change are used in this study. They are as follows:

- Lack of senior management support to improve the management accounting systems.
- Lack of role model from other organizations on the success of the new techniques.

- Lack of preparation, thinking and decision-making on the change.
- Complex and hard to modify computerized accounting systems.
- Managers fear their own performance will become more visible because of the change.
- Change is headed by staff recruited from outside the organization.
- The new management accounting systems are in conflict with existing rules and routines.

These causes are not meant to be exhaustive, but are simply used as a memory aid for respondents. The study analyses the frequencies of each possible reason on each MACS.

4.5.2 Results

This section discusses the reasons of the resistance to management accounting change investigation. The results may represent one explanation for the variation evident in observed change frequencies. Table 31 below shows 62% of the organisations in the sample have not faced any management accounting change resistance of the types outlined above. This result supports Williams and Seaman's (2001) suggestion that there does not appear to be strong resistance to change. The remaining 38% of the organsiations have however, experienced a range of types of management accounting change resistance in their MACS. The analysis of the possible reasons for management

accounting change resistance on the remaining 38% organizations is discussed in the following paragraphs.

Table 31

Resistance faced by organizations (n = 92)

	%
Never faced any management accounting change resistance	62.0
Faced with one or several reasons	38.0
	100.0

The frequencies of each possible reason for management accounting change resistance for each MACS (planning, controlling, costing, directing, decision-making) are outlined in the following Table 32.

Table 32

Sources of resistance to change

POSSIBLE REASONS	PLANNING		CONTROL-LING		COST-ING		DIRECT-ING		DECISION-MAKING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%
1. Lack of senior management support to improve the management accounting system	12	**21.1**	14	**19.4**	12	23.5	7	17.5	11	**19.6**	**56**	**20.3**
2. Lack of role model from other organizations on the success of the new techniques	10	17.5	10	13.9	7	13.7	5	12.5	8	14.3	**40**	**14.5**
3. Lack of preparation, thinking and decision-making on the changes	10	17.5	6	8.3	3	5.9	5	12.5	10	17.9	**34**	**12.3**
4. Complex and not easily modified computerized accounting systems	10	17.5	11	15.3	16	**31.4**	4	10.0	7	12.5	**48**	**17.4**
5. Managers fear their own activity become more visible with the change	6	10.5	14	**19.4**	4	7.8	10	**25.0**	6	10.7	**40**	**14.5**
6. Change headed by staff recruited from outside the organization	4	7.0	9	12.5	5	9.8	7	17.5	7	12.5	**32**	**11.6**
7. The new management accounting systems resulted into conflict with existing rules and routines	5	8.9	8	11.2	4	7.9	2	5.0	7	12.5	**26**	**9.4**
	57	**100**	**72**	**100**	**51**	**100**	**40**	**100**	**56**	**100**	**276**	**100**

F = Frequency
% = Percentage

Causes of resistance were well distributed over the seven categories.

4.5.3 Lack of senior management support to improve the management accounting system

Lack of senior management support to improve the management accounting system was the largest overall cause (20.3%) and was also the most prominent one in three of the five sub-areas of MACS. This is the main cause of resistance to changes in planning (21.1%), decision-making (19.6%) and controlling (19.4%) systems.

4.5.4 Complex and not easily modified computerized accounting systems

Complex and not easily modified computerized accounting systems was also a prominent reason (17.4%) and accounted for almost a third of the resistance in the costing sub-areas.

4.5.5 Managers fear their own activity will become more visible with the change

Managers fearing that their own activity will become more visible with the change contributes to about 15% of the overall MACS sources of resistance to change. Almost a fifth and fourth of the resistance to change in the controlling and directing sub-areas respectively are due to this reason.

4.5.6 Lack of role model from other organizations on the success of the new techniques

The lack of a role model from other organizations on the success of the new techniques also contributed to about 15% of the overall MACS sources of resistance to change. This source also accounted for almost 18% of resistance to change in planning sub-areas but was of less significance to other sub- areas.

4.5.7 Lack of preparation, thinking and decision-making on the changes

Lack of preparation, thinking and decision-making on the changes appears to contribute to about 13% of the overall MACS sources of resistance to change. Resistance to change in decision-making (17.9%) and planning (17.3%) sub-areas are also evident in this causal factor.

4.5.8 Change headed by staff recruited from outside the organisation

Change headed by staff recruited from outside the organisation is the second least common cause (11.6%) of overall MACS resistance to change. This cause contributed to about 18% of resistance to change in directing sub-areas and much less in other systems.

4.5.9 The new management accounting systems resulted in conflict with existing rules and routines

The least common overall cause (9.4%) across the five sub-areas of MACS was the new management accounting systems resulting in conflict with existing rules and routines.

4.6 SUMMARY

The management accountant's role in manufacturing organizations has changed from 'controller' to 'business support' (Burns and Vaivio, 2001). This is supported by a considerable variety of job titles given to them. It also suggests that management accountants today are more proactive and have a wider job scope which involves areas such as strategy, system implementation and management. This exposes them directly to a range of information needs and may lead to them initiating change in management accounting areas which include planning, controlling, costing, directing and decision-making.

During the period 1997 to 2001, planning, controlling and decision-making systems seem to have changed of all most in Malaysian manufacturing organizations. Modification in the management accounting information or output and replacing existing techniques were the most common change dimensions. This indicates that most

changes were built on the existing system or on the modification of information or outputs from continuing systems.

This chapter also analysed factors that caused management accounting to change or not to change. Each positive, influential factor demonstrated different significant correlation levels towards a number of changes in MACS and its sub-systems. There are however also several factors causing management accounting resistance to change. Lack of support from senior management and hard-to modified computerized accounting systems are the main source of resistance to MACS to change. Resistance to MACS changes are partly due to 'human' and partly due to accounting system factors.

CHAPTER FIVE

REPLICATION AND COMPARISONS

5.1 INTRODUCTION

This chapter contains a replication of the original study of this type by Libby and Waterhouse (1996, hereafter L&W). There are two sub-sections. The first sub-section contains several modifications on L&W independent variables on the change in management accounting and control systems (MACS). This is followed by a sub-section which compares the results of this study to those of L&W and Williams and Seaman (2001, hereafter W&S) who replicated the L&W study in Singapore. Descriptive statistics, correlation and regression between the dependent and independent variables are compared across the L&W, W&S and this study.

5.2 SECTION ONE

STATISTICAL ANALYSIS OF RESULTS:

5.2.1 Replication of prior studies

This section contains a replication of the original study of this type by L&W. It was an exploratory study which examined change in management accounting and control systems (MACS) in a sample of Canadian manufacturing organisations. The focus was on change at the organisational level, rather than on the management of change within organisations. Based on a contingency theory perspective, four independent variables were identified by L&W as potentially relevant predictors of change in management accounting systems: (1) decentralization, (2) size, (3) competition, and (4) capacity to learn.

The following paragraphs show the descriptive statistics (Table 33) of this study for those dependent and independent variables.

Table 33

Dependent and independent variables

Descriptive Statistics (n= 92)

	Mean	Standard Deviation	Observed Range	Theoretical Range
Number of changes	9.51	5.11	0 – 17	0 - 23
Competition (rating on 5 Likert point scale)*	2.52	0.76	0 – 4	0 – 5
Organisation structure (rating on 5 Likert point scale)*	2.26	0.95	0 – 5	0 – 5
Size (no. of employees)	889	3011	17 - 28112	$X \supseteq 100$
Organisational capacity (based on no. of existing systems)	16.17	2.33	1 - 20	0 - 23

* 0 = no effect; 1 = little effect; 2 = medium effect; 3 = strong effect; 4 = very strong effect

5.2.2 The dependent variable: change in MACS

L&W measured the dependent variable, the number of changes in MACS, by measuring the sum of the reported number of changes during a three-year period (1991-1993). Change volume was obtained by counting the respondents replies on changes made in a list of 23 different management accounting systems that had been divided into five main types: Planning; Controlling; Costing; Directing; and Decision-making. This approach with the modifications detailed below was largely replicated in this study. However, the pilot study which was conducted showed that respondents had difficulty in recalling the year in which changes occurred. Prior literature analysis and pilot study comments

indicated that MACS changes can take the form of a process and evolve over several years. It is therefore difficult to locate in which year the changes actually took place. As stated by Libby and Waterhouse (1996, p. 148) in their limitations section as,

> We attempted to ameliorate this by asking respondents to recall whether various components of their organizations had changed within specified time periods. The respondents may have suffered from hindsight bias or, simply, forgetfulness

Thus this study measures the number of changes in MACS by simply counting the number of changes by their different change dimensions on the list of 23 sub-systems. No attempt was made to have respondents locate them in a specific year. Respondents were required to indicate any of the types of change that have occurred during the five year period (1997 – 2001 inclusive). A longer time period was selected in this study period as compared to the three-year period used by L&W and W&S. Respondents were also invited to add to the list of 23 items but only 4% (4/92 respondents) of them did[3].

[3] Other sub-systems stated: Controlling (payroll systems); Planning (stocks control); Directing (performance incentive based on production and production incentive scheme); Other changes[Enterprise Resources Planning Systems (ERPs)]

The mean number of changes in the sample was 9.51 changes out of 23 listed management accounting and control systems in the period 1997 – 2001. The standard deviation was 5.11. The maximum number reported was 17 and the minimum was 0 on a possible range of 0 to 23.

5.2.3 Competition

L&W measured the intensity of competition faced by organizations using a competitive pressure scale which consisted of five questions calling for a rating of the intensity of competition for raw materials, technical personnel, selling and distribution quality, variety of products and price on a scale from 1 (negligible) to 5 (extremely intense). The study shows a positive correlation between competition and the number of changes in MACS. This study adopted a more direct approach requiring respondents to assess the impact of competition on MACS. Competition's effects were measured on the basis of each respondent's perception of the influence level between competition and each of the MACS dimensions: Planning; Controlling; Costing; Directing, and Decision-making. As competition covers a wide spectrum of issues, respondents were provided with examples. The examples given were quality improvement, cost minimization, international competition, lower cost technology and waste reduction. Five different influential levels ranging from 0 to 5, which indicate 'no effect' to 'very strong effect' were adopted in this study.

Competition's effect was measured, by multiplying each MACS: Planning; Controlling; Costing; Directing and Decision-making with their respective influential levels. The average of the five MACS is the competition influence for each organization. The mean of the competition in the sample was 2.52 and the standard deviation was 0.76. The maximum value reported was 4.00 and the minimum value was 0 on a possible range of 0 – 5.

5.2.4 Organisational structure (e.g. decentralization)

L&W measured the degree of decentralization by asking respondents to identify the most junior level of job that has the authority to make decisions on a list of operating policies. Five possible levels were included ranging from production worker to someone outside the particular location. The L&W study does not show the expected positive relationship between changes in MACS and organisational decentralization. The influence of the degree of decentralization on each of the MACS components was also ignored. A modified version of the degree of organizational structure influence is adopted in this study. This is based on the respondent's perception of the influence of the organisational structure (e.g. degree of decentralization) on each of the MACS dimensions: Planning; Controlling; Costing; Directing; and Decision-making. Corresponding to each of these MACS sub-systems, there was a rating of how influential organisational structure has been. This ranged from 'no effect' to 'very strong' effect'.

Organisational structure was measured, by multiplying each MACS: Planning; Controlling; Costing; Directing and Decision-making with their respective influential levels. The average influential level of the five MACS is the organisational structure influence for each organization. The mean of the organizational structure in the sample was 2.26 and the standard deviation was 0.95. The maximum value reported was 5.00 and the minimum value was 0 on a possible range of 0 – 5.

5.2.5 Size

The number of employees working for an organization is used to define size by L&W. According to L&W larger organsiations may have greater resources with which to innovate. However, bureaucratization also increases with size and may act as a deterrent to change in MACS. An employee based measure of size has also been adopted in this study. The approximate mean number of employees of organizations in the sample in 2001 was 889 and 3011 was the standard deviation.

5.2.6 Capacity to learn

Organizations that have invested in a large number of MACS and have a high number of accounting personnel may be more able to respond to changes in or challenges arising from their environments by changing their MACS (Libby and Waterhouse, 1991, p.141). Therefore, L&W measured the organizational capacity to learn by the

number of systems that existed in the last year of the study i.e. 1993. Similarly, in this study the number of systems existing in 2001 in each of MACS five main components (planning, controlling, costing, directing, decision-making) were identified by counting each respondent's answer on the replicated list of 23 different management accounting systems. The mean score was 16.17 systems existing in the sample organsiations and the standard deviation was 2.33. The maximum value reported was 20 and the minimum was 1 on a possible range of 0 – 23. The measure of organizational capacity is based on the list of 23 systems together with the small number of other systems specified by respondents. These systems are categorized as either planning (mean = 3.89 systems), controlling (mean = 3.86 systems), costing (mean = 3.78 systems), directing (mean = 1.83 systems) and decision-making (mean = 2.87) as was true of the dependent variable measure.

5.2.7 Results: Number of changes in MACS

Overall, the study indicated that, on average, organizations in the sample implemented 9.51 changes (875 systems / 92 organisations) in their management accounting and control systems during the 1997 – 2001 period. This represents an average rate of change of almost 2 per year. Table 34 below interprets the number of changes given the number of systems existing in the organization in 2001, on average 58.8% (875 systems change / 1488 systems exist) of the systems in a given organization changed. The most frequent to change in this study were planning systems (27.5%) followed by controlling

(25.3%), decision-making (21.8%), costing (18.5%) and directing (6.9%). All systems exhibited a significant degree of change: Decision-making (72.3%, 191/264); Planning (67.3%, 241/358); Controlling (62.3%, 221/355); Costing (47.2%, 162/343); and Directing (35.7%, 60/168).

Table 34

MACS frequency (n = 92)

MACS main components	Total number of changes to systems	%	Total number of unchanged systems	%	Total systems exist	(%)
Planning	241	27.5	117	19.1	358	24.0
Controlling	221	25.3	134	21.9	355	23.8
Costing	162	18.5	181	29.5	343	23.0
Directing	60	6.9	108	17.6	168	11.3
Decision-making	191	21.8	73	11.9	264	17.7
TOTAL	**875**	**100**	**613**	**100**	**1488**	**100**

5.2.8 Results: Number of changes in management accounting and control sub-systems

The five MACS represent 23 sub-systems and Table 35 shows the changes in each of these areas. The results indicate that change was spread throughout all of the component areas. The high proportion of systems which were changed and the high significance

ratings accorded to the changes during the period support L&W claim that MACS are not generally very resistant to change.

Table 35

Management accounting sub-systems changes (number and percentages)

Management accounting sub-systems	Total number of changes	Percentage (%)	Total Percentage (%)
PLANNING SYSTEMS			
Budgeting	68	28.2	
Operations planning (production)	68	28.2	
Capital budgeting	46	19.1	27.5
Strategic planning	59	24.5	
Others	-	-	
TOTAL	**241**	**100**	
CONTROLLING SYSTEMS			
Performance measurement:			
• Individual or team-based	52	23.5	
• Organisational	54	24.4	
• Product quality	61	27.7	25.3
• Customer service	54	24.4	
Others	-	-	
TOTAL	**221**	**100**	
COSTING SYSTEMS			
Direct allocation			
• Manufacturing overhead	45	27.7	
• Selling and marketing costs	44	27.2	
• Other overhead (eg: administration)	43	26.5	18.5
Internal (divisional or dept) product transfers	30	18.6	
Others	-	-	
TOTAL	**162**	**100**	
DIRECTING SYSTEMS			
Reward systems			
• Bonuses	29	48.3	
• Pay-for-performance plans	29	48.3	6.90
Others [4]	2	3.4	
TOTAL	**60**	**100**	
DECISION-MAKING SYSTEMS			
Information reported more frequently	68	35.6	
Use of more non-financial measures	56	29.3	
Information reported more broadly	67	35.1	21.8
Others	-	-	
TOTAL	**191**	**100**	**100**
TOTAL MACS CHANGES	**875**		

5.2.9 Results: Correlates of change

The correlation and Cronbach alpha reliability coefficients of the variables are shown in Table 36 below. The reliability of each of the independent variables with multiple measures was assessed by calculating Cronbach (1951) alpha coefficients. All of the coefficients satisfied recommended levels of reliability (Nunnally, 1967) and were greater than the acceptable minimum[5]. A review of the correlation matrix indicates that the intensity of competition, level of organizational structure and the organization's capacity to learn are significantly related to the number of MACS changes. The independent variables are generally not significantly correlated with each other except for a strong positive correlation between competitiveness and organisational structure ($r = 0.574$, $p < 0.01$). These relationships suggest that changes in MACS are heavily influenced by the degree of competition experienced by an organisation and by the extent to which it is decentralized.

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[4] Changes were only reported on the two directing sub-systems, there were no changes on the other reported systems

[5] http://www.oac.ucla.edu/stat/spss/faq/alpha.html stated that the reliability coefficient of 0.80 or higher is considered as "acceptable" in most Social Science applications.

Table 36

Correlations and Reliabilities matrix (n=92)

Variable	1	2	3	4	5
1. Number of MACS changes	NA				
2. Competition	0.336**	**0.909**			
3. Organization structure	0.280**	0.574**	**0.955**		
4. Size (no. of employees)	0.079	0.005	-0.058	NA	
5. Organisational capacity to learn	0.253*	-0.075	-0.009	0.049	NA

MACS, management accounting and control systems

*p < 0.05

**p < 0.01

Cronbach alpha reliabilities appear in the diagonal cells

5.2.10 Results: General Linear Model (GLM)

While, L&W adopted multiple-regression in their study, GLM has been used in this study. GLM allows the researcher to summarize a wide variety of research outcomes (Johnston, 1978; Koerts and Abrahamse, 1969; [6]). GLM can be seen as an extension of multiple regression for a single dependent variable. There are several ways in which GLM extended the multiple regression model. It permits the analysis of linear combinations of multiple dependent variables, dealing with redundant predictor variables and recoded categorical predictor variables[7]. The major limitations of multiple

[6] http://trochim.human.cornell.edu/kb/genlin.htm
[7] http://www.statsoft.com/textbook/stglm.html

regressions are overcome by GLM. Due to its generality, robustness and the comparability of its results which can be compared with multiple regression results it is used in this study to test the hypothesized relationships between the dependent and independent variables discussed above.

$$\mathbf{NCHANGE = \alpha_0 + \beta_1 COMP + \beta_2 ORG.STRUC + \beta_3 SIZE + \beta_4 CAP}$$

Where:

NCHANGE	=	Number of changes in MACS
COMP	=	Intensity of competition (+)
ORG.STRUC	=	Organization structure (+)
SIZE	=	In (number of employees) (+)
CAP	=	Organizational capacity to learn (+)

The dependent variable, number of changes in MACS, fulfills the requirements of the GLM very well and it is supported by the following statistical tests:

1. The following univariate analysis of variance Table 37 shows that the model above is explained by at least one ($\geq$ 1) of the independent variables. This is shown by the F-test result (F = 6.386) and its associated probability, which is less than 0.05 level (p = 0.000). The observed power shown by the variables, competition, organization structure, size and the capacity to learn are 0.70, 0.24,

0.11 and 0.82, respectively[8]. Based on a sample size of 92 organisations, the number of management accounting changes seem to be most influenced by competition and the capacity to learn. This is supported by Table 38 which shows the significant value for competition (p = 0.015) and capacity to learn (p = 0.004). However a larger sample size (> 92 organisations) would be needed to improve the observed power for the remaining two independent variables, organisational structure and size

Table 37

Univariate Analysis of Variance

	Type III sum of squares	**df**	**Mean square**	**F**	**Sig.**	**Observed Power**
Corrected Model	531.962[b]	4	132.991	6.386	0.000	0.987
Intercept	67.327	1	67.327	3.233	0.076	0.427
Competition	128.968	1	128.968	6.193	0.015	0.691
Organsiation structure	34.092	1	34.092	1.637	0.204	0.244
Size (no. of employees)	11.311	1	11.311	0.543	0.463	0.113
Capacity to learn	178.154	1	178.154	8.554	0.004	0.824
Error	1666.085	80	20.826			
Total	10186.000	85				
Corrected total	2198.047	84				
Computed using alpha = 0.05						
R Squared = 0.242 (Adjusted R Squared = 0.204)						

[8] An acceptable level for a particular test is at least 0.70. However, variables with observed power less than 0.70 could be improved by increasing their sample size.

Table 38

Parameter Estimates

Parameter	B	Std. Error	t	Sig.
Intercept	-6.893	3.833	-1.798	0.076
Competition	1.935	0.778	2.489	0.015
Organisation structure	0.809	0.632	1.279	0.204
Size (no. of employees)	1.224E-04	0.000	0.737	0.463
Capacity to learn	0.606	0.207	2.925	0.004

a. Computed using alpha = 0.05

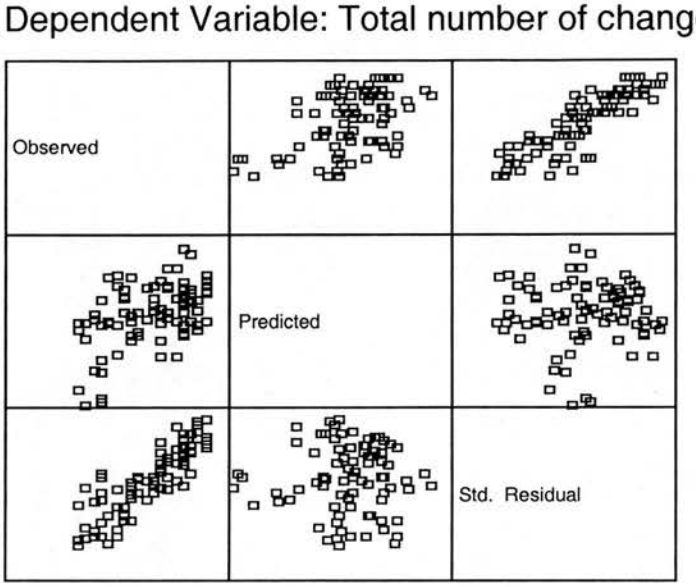
The GLM results show that 20.4 percent (Adjusted R^2; R^2 = 24.2%) of the number of changes in MACS is explained by the four independent variables: competition, organization structure, size and the capacity to learn. This implies, 79.6% (100.0 – 20.4) of the number of changes in MACS in this study are not explained by these factors. Other factors must also be influential in MACS change.

2. The residual plot between the predicted against standard residual below shows that the residuals are randomly distributed (randomness) and identically distributed [N $(0,\alpha_2)$].

FIGURE 4

RESIDUAL PLOT (ORIGINAL MODEL)

(PREDICTED AGAINST STANDARD)



3. The Kolmogorov-Smirnov test of normality in Table 39 also shows that the residual plot is normally distributed with the p-value of 0.200 (eg: > 0.05). The chi-squared and Kolmogorov-Smirnov tests have already been compared by Lilliefors (1967). His results showed that for the case considered, the Kolmogorov-Smirnov test is much more powerful than the chi-square test and an additional advantage is its simplicity in application (Koerts and Abrahamse, 1969).

Table 39

Tests of Normality

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Residual for total change in MACS	0.080	85	0.200*

* This is a lower bound of the true significance

a Liliefors significance correction

4. The absence of multicollinearity is essential to GLM and Variance Inflation Factor (VIF) that is a common way for detecting multicollinearity among the independent variables (predictors). Table 40 below shows there is no multicollinearity problem among the independent variables as VIF for each independent variable is small (less than 4)[9]. Therefore the exogenous (independent) variables are themselves not highly correlated with each other.

Table 40

Multicollinearity among the independent variables

Model	**Collinearity Statistics**	
	Tolerance	**VIF**
Competition	0.655	1.527
Organisation structure	0.656	1.523
Size (no. of employees)	0.991	1.009
Organisation capacity to learn	0.988	1.012

[9] http://seamonkey.ed.asu.edu/~alex/computer/sas/collinear_VIF.html stated that a general rule is that the VIF should not exceed 10.

Results of the regression analysis are summarized in Table 41. As a conclusion, the intensity of competition faced by the organisation and its capacity to learn are the best predictors of the number of changes in MACS. Organisation structure and size are not significant predictors for MACS changes but investigation of their influence could be improved by increasing the sample size (> 92 organisations).

This study also assessed changes to the five components of MACS: Planning; Controlling; Costing; Directing; and Decision-making. The proportion of changes occurring in each area was as follows: planning systems (27.5%), controlling (25.3%), decision-making (21.8%), costing (18.5%) and directing (6.9%). In order to assess whether the independent variables (competition, organization structure, size and organization capacity) were associated with the overall change in each component of MACS, univariate analyses of variance were undertaken to test the significance of the corrected model (F-value), observed power and parameter estimates on each of the five MACS components. The results for the planning and controlling systems are similar to the overall results. Changes to the directing and decision-making systems were best predicted by the organization's capacity to learn. However no statistically significant coefficients were found for the costing system.

Table 41

Regression Analysis Results (n = 92)

VARIABLE	TOTAL	PLANNING	CONTROLLING	COSTING	DIRECTING	DECISION -MAKING
COMPETITION	1.935*	0.552*	0.699**	0.197	0.243	0.276
ORGANISATION STRUCTURE	0.809	0.320	0.0069	0.272	0.0582	0.109
SIZE (no. of employees)	0.0001	0.00004	0.00004	0.000	0.00005	0.00003
ORGANISATION CAPACITY	0.606**	0.664**	0.751**	0.535	0.462**	0.646**
R - SQUARE	0.242	0.303	0.229	0.10	0.167	0.206
ADJ.R- SQUARE	0.204	0.268	0.190	0.055	0.125	0.166
F	6.386**	8.701**	5.940**	2.233	4.003**	5.175**

*p < 0.05, **p < 0.01

5.3 SECTION TWO

STATISTICAL ANALYSIS OF RESULTS:

5.3.1 Comparison of results with prior studies

This section compares the results of this study to those of L&W and W&S. L&W's exploratory study examines the extent and causes of changes in management accounting control systems (MACS) in a sample of Canadian manufacturing organisations. W&S replicate and extend the study by L&W by using a Singaporean sample and Hofstede's cultural framework on multiple economic sectors sample (manufacturing, industrial and

service organizations) to extend MACS change across different national cultures. The study covered management accounting changes over the period January 1995 to end-June 1997. According to W&S (2001, p. 447), the economy had not yet experienced any adverse effects emerging from the Thai currency devaluation which erupted in early July. Some modifications on variables have been adopted in W&S and in this study. W&S have changed decentralization to centralization and the previously explained modifications on how to measure competition and organisational structure variables were adopted in this study.

There are three sub-sections of comparison based on descriptive statistics for all study variables among those reported in the first subsection. In the second subsection, the correlation between the dependent and independent variables are compared. Regressions of the dependent and independent variables are then compared across the three studies in the third subsection.

5.3.2 Descriptive statistics

The next three tables show that the means of the variables for all the competition, organistion structure and organizational capacity to learn variables for all the three studies were approximately at the middle of their respective ranges. Competition and organisational structure were measured on a different basis in this study thus giving rise to very different absolute values for these variables. The number of changes was

markedly higher in this study and to some extent this reflects the fact that the study covered a five-year period. Size as indicated by the mean number of employees was similar although this study's higher standard deviation indicates a wider range of sizes. The number of systems existing in this study's companies was also almost 25% greater than in the L&W and W&S studies.

Table 42 (i)

LIBBY AND WATERHOUSE (1996)

Descriptive Statistics (n= 24)

	Mean	Standard Deviation	Observed Range	Theoretical Range
Number of changes	4.46	3.98	0 – 15	0 - 23
Competition	16.59	3.83	8.38 – 22.24	5 – 25
Decentralization	37.50	38.50	7.21	15 – 75
Size (no. of employees)	876	2337.09	25 – 12600	$\supseteq$ 100
Organisational capacity	13.10	4.67	1 - 20	0 - 23

Table 42 (ii)

WILLIAMS AND SEAMAN (2001)

Descriptive Statistics (n= 93)

	Mean	Standard Deviation	Observed Range	Theoretical Range
Number of changes	3.70	3.77	0 – 17	0 - 23
Competition	17.90	3.37	8 - 24	5 – 25
Centralization	74.68	7.98	49 - 90	23 - 115
Size (no. of employees)	784	1536.30	100 - 8000	$X \supseteq 100$
Organisational capacity	12.10	5.09	1 - 23	0 - 23

Table 42 (iii)

THIS STUDY (2002)

Descriptive Statistics (n= 92)

	Mean	Standard Deviation	Observed Range	Theoretical Range
Number of changes	9.51	5.11	0 – 17	0 - 23
Competition	2.52	0.76	0 – 4	0 – 5
Organisation structure	2.26	0.95	0 – 5	0 – 5
Size (no. of employees)	889	3011	$17 \subseteq x \supseteq 28{,}112$	$X \supseteq 100$
Organisational capacity	16.17	2.33	1 - 20	0 - 23

5.3.3 Number of changes

The number of changes in MACS identified for each of the five components of MACS is contained in the following Table 43. The L&W and W&S studies show a total of 107 (1991 – 1993) and 344 (1995 – mid 1997) changes respectively during the three year period of their studies, respectively. These studies suggest that, on average, each organization changed its MACS components 4.46 and 3.70 times, respectively. This study however shows a total of 875 changes during its five year period (1997 – 2001) with each organization changing its MACS on average 9.51 times. Thus this study's respondents exhibited a considerably greater propensity to change [average annual changes were 1.49 (L&W), 1.23 (W&S) and 1.90 (this study) changes]. This is particularly apparent in the markedly higher volumes of changes in all of the sub-systems except directing.

Table 43

MACS changes frequency comparison

MANAGEMENT ACCOUNTING AND CONTROL SYSTEMS (MACS)	LIBBY & WATERHOUSE (1996)			WILLIAMS & SEAMAN (2001)			THIS STUDY (2002)		
	NO.	%	RANK	NO.	%	RANK	NO.	%	RANK
Planning	17	16.0	3	86	25.0	2	241	27.5	1
Controlling	32	30.0	2	79	23.0	3	221	25.3	2
Costing	13	1.0	4	34	10.0	5	162	18.5	4
Directing	11	10.0	5	52	15.0	4	60	6.9	5
Decision-making	34	32.0	1	93	27.0	1	191	21.8	3
	107	100		344	100		875	100	
N	24			93			92		
Average number of changes	**4.46**			**3.70**			**9.51**		

The rankings of these sub-systems based on relative change volumes have a broad similarity in that the first three ranks are taken by the same sub-systems (planning, controlling, decision-making) in all of the studies while the same can be said of the bottom two rankings (costing and directing).

5.3.4 Correlates of change

The following Tables 44 (i), (ii) and (iii) contain Pearson correlation matrices for the measured variables. The relevant Cronbach alpha coefficients for the variables with multiple measures (competition and organization structure) are also given. The L&W

results [Table 44 (i)] indicate that organizational capacity to learn is significantly related to number of changes and the intensity of competition ($r = 0.55$, $p < 0.01$). These relationships suggest that MACS are relied upon more heavily in organizations that experience high degrees of competition. The W&S study [Table 44 (ii)] shows there is a strong positive correlation ($r = 0.34$, $p < 0.01$) between changes in MACS and centralization suggesting that the number of component changes is associated with more centralized organizational structures. In this study [Table 44 (iii)], a review of the correlation matrix indicates that the intensity of competition, level of organizatioal structure and the organizational capacity to learn are all significantly related to the number of changes. These relationships suggest that MACS are relied upon heavily by organizations that experience a high degree of competition, more decentralized organization structure and a greater capacity to learn.

The independent variables, in general are not significantly correlated. In each of the three studies there is one strong positive correlation. This is between competitiveness and organizational capacity to learn in L&W ($r = 0.49$, $p < 0.05$), in W&S ($r = 0.25$, $p < 0.05$) and between competitiveness and organizational structure in this study ($r = 0.574$, $p < 0.01$).

Table 44 (i)

LIBBY & WATERHOUSE (1996)

Correlations and Reliabilities matrix (n=24)

	Variable	1	2	3	4	5
1.	Number of changes	NA				
2.	Competition	0.32	**0.63**			
3.	Decentralization	-0.14	-0.12	**0.75**		
4.	Size (no. of employees)	0.17	0.11	-0.33	NA	
5.	Organisational capacity	0.55**	0.49*	-0.23	0.29	NA

Table 44 (ii)

WILLIAMS & SEAMAN (2001)

Correlations and Reliabilities matrix (n=93)

	Variable	1	2	3	4	5
1.	Number of changes	NA				
2.	Competition	-0.04	**0.68**			
3.	Centralization	0.34**	0.14	**0.80**		
4.	Size (no. of employees)	-0.17	-0.01	-0.13	NA	
5.	Organisational capacity	-0.01	0.25*	-0.01	0.22*	NA

Table 44 (iii)

THIS STUDY (2002)

Correlations and Reliabilities matrix (n=92)

	Variable	1	2	3	4	5
1.	Number of changes	NA				
2.	Competition	0.336**	**0.909**			
3.	Organization structure	0.280**	0.574**	**0.955**		
4.	Size (no. of employees)	0.079	0.005	-0.058	NA	
5.	Organisational capacity	0.253*	-0.075	-0.009	0.049	NA

MACS, management accounting and control systems

* $p < 0.05$

** $p < 0.01$

Cronbach alpha reliabilities appear in the diagonal cells

5.3.5 Regression analysis results

The following regression model and GLM were used to test the hypothesized relationships between the dependent and independent variables in the three studies.

$$\mathbf{NCHANGE = \alpha_0 + \beta_1 COMP + \beta_2 ORG.STRUC + \beta_3 SIZE + \beta_4 CAP}$$

Where:

NCHANGE	=	Number of changes in MACS
COMP	=	Intensity of competition (+)
ORG.STRUC	=	Org. structure (decentralization/centralization(+)
SIZE	=	In (number of employees) (+)
CAP	=	Organizational capacity to learn (+)

Tables 45 show that the four independent variables together explain 16% (L&W), 21% (W&S) and 20.4% (this study) of the variance in the number of MACS changes.

Table 45 (i) shows that the change in management accounting and control system was best predicted by organizational capacity to learn in the L&W study. In order to assess whether the independent variables were associated with changes to the components of MACS, regressions were run using the number of changes in the five components in MACS as dependent variables. Only decision-making showed significant results which were similar to the overall regression.

The W&S study runs separately for each of the three sub-samples (manufacturing, industrial and service organisation). The overall result [Tables 45 (ii)] centralization is the only significant predictor of changes in MACS. However the results show that different variables are associated with changes in MACS at the component level for controlling, costing and decision-making. Table 45 (iii) shows the results for the

manufacturing sector. There are significant relationships for the number of changes in MACS, controlling and decision-making components. The number of changes in MACS is significantly associated with decreasing competition, more centralization and more organizational capacity to learn. Changes in the controlling component are significantly associated with less competition, smaller firms and more organizational capacity to learn. Decision-making changes are significantly associated with less competition and more centralization.

This study [Table 45 (iv)] shows that competition and organizational capacity to learn were the best predictors of change in MACS. Four of the five MACS (with the exception of costing) showed significant results. While planning and controlling had the same two significant variables, in directing and decision-making only the organisational capacity to learn was a significant variable.

Table 45 (i)

LIBBY & WATERHOUSE (1996)

Regression Analysis Results (n = 24 manufacturing organisations)

VARIABLE	TOTAL	DECISION-MAKING
COMPETITION	0.07	-0.12
DECENTRA-LIZATION	-0.02	-0.08
SIZE (no. of employees)	0.01	-0.09
ORGANISATION CAPACITY	0.50**	0.63**
R - SQUARE	0.30	0.33
ADJ.R- SQUARE	0.16	0.19
F	2.08	2.36*

**p < 0.05; *p < 0.10

Table 45(ii)

WILLIAMS & SEAMAN (2001)

Regression Analysis Results for the Total Sample (n = 93 organisations)

VARIABLE	TOTAL	CONTROLLING	COSTING	DIRECTING	DECISION-MAKING
COMPETITION	-0.11	-0.06	-0.02	-0.20	0.15
CENTRA-LIZATION	0.34**	0.21**	0.29***	0.31**	0.24**
SIZE (no. of employees)	-0.15	-0.20**	0.04	-0.09	0.14*
ORGANISATION CAPACITY	0.06	0.14*	-0.16*	0.10	0.05
R - SQUARE	0.15	0.10	0.11	0.13	0.09
ADJ.R- SQUARE	0.11	0.06	0.07	0.09	0.05
F	3.74***	2.36*	2.72**	3.20**	2.27*

*p < 0.10; **p < 0.05; ***p < 0.01

Table 45 (iii)

WILLIAMS & SEAMAN (2001)

Regression Analysis Results (n = 25 manufacturing organisations)

VARIABLE	TOTAL	CONTROLLING	DECISION-MAKING
COMPETITION	-0.42**	-0.25*	-0.47**
CENTRA-LIZATION	0.35**	0.07	0.27*
SIZE (no. of employees)	-0.18	-0.40**	0.00
ORGANISATION CAPACITY	0.30*	0.52***	0.20
R - SQUARE	0.34	0.33	0.30
ADJ.R- SQUARE	0.21	0.20	0.16
F	2.58*	2.46*	2.22*

*p < 0.10; **p < 0.05; ***p < 0.01

Table 45 (iv)

THIS STUDY (2002)

Regression Analysis Results (n = 92 manufacturing organisations)

VARIABLE	TOTAL	PLANNING	CONTROLLING	COSTING	DIRECTING	DECISION-MAKING
COMPETITION	1.935*	0.552*	0.699**	0.197	0.243	0.276
ORGANISATION STRUCTURE	0.809	0.320	0.0069	0.272	0.0582	0.109
SIZE (no. of employees)	0.0001	0.00004	0.00004	0.000	0.00005	0.00003
ORGANISATION CAPACITY	0.606**	0.664**	0.751**	0.535	0.462**	0.646**
R - SQUARE	0.242	0.303	0.229	0.10	0.167	0.206
ADJ.R- SQUARE	0.204	0.268	0.190	0.055	0.125	0.166
F	6.386**	8.701**	5.940**	2.233	4.003**	5.175**

*p < 0.05; **p < 0.01

5.4 SUMMARY

A higher average number of changes in MACS was found in this study. This is only partly due to the longer period (5 years) as compared to 3 years in L&Ws' and W&Ss' studies. W&S study was conducted before the Asian financial crises in mid-1997. The study was conducted during a period when Singapore's GDP, growth averaged 7.9% and the Straits Times Index of stock prices was stable (W&S, 2001, p. 448). The period of this study however was a particularly turbulent one for Malaysia. The adverse environmental circumstances are likely to have promoted change particularly in the planning and controlling systems.

The overall results of L&W, W&S and this study showed considerable organizational capacity to learn as a significant influence to changes in MACS. Organizations that have a larger number of management accounting and control systems are more likely to respond to their environmental challenges. The environment has more to influence. This type of organization, possesses expertise in more MACS areas and they are likely to be able to utilize this to introduce new, modify existing or remove elements of management accounting systems.

CHAPTER SIX

EXTENSION AND MODIFICATION OF THE REPLICATED MODEL

6.1 INTRODUCTION

The analysis in this chapter extends the work of L&W in three ways. The first section analyses the significance of L&W's four independent variables, competition, organisational structure, size and organisation capacity to learn, in respect of the five different change dimensions used in this study, the five main MACS and their sub-systems. The second section adds to L&W's four independent variables as a way of improving the explanatory power of the MACS change regression model. The new model is in turn applied to the five MACS, the different change dimensions and the 23 management accounting and control sub-systems. This is the substance of the third section.

6.2 SECTION ONE

STATISTICAL ANALYSIS OF RESULTS:

6.2.1 Different MACS change dimensions

This subsection will extend the L&W study in a number of ways. The first relates to the dependent variable, the number of changes in MACS. In L&W, the study only analysed the correlation between the number of changes in MACS and the four independent variables: intensity of competition, organizational structure, size and capacity to learn. The number of MACS changes used in the L&W study therefore implicitly treats change as homogeneous. It does not take account of different types of management accounting change. There is a variety of types of change which could be applied to management accounting as outlined in chapter 2. There are five common types of changes identified from previous management accounting change research.

Table 46

Overall change significance, success and MACS change

Descriptive statistics

	Significant	Success
Mean	1.07	1.25
Standard deviation	0.79	0.79

Based on a 3 point scale: 1 = low significance, 2 = significance, 3 = high significance

Table 46 shows that the overall changes on MACS are closely linked to the lowest significance and success levels.

Table 47

Pearson correlation matrix

MACS change dimension and their significance and success

	MACS change dimensions	Significant	Success
1.	Introduction of new techniques as replacement for existing ones	0.313**	0.157
2.	Introduction of new techniques where no management accounting previously existed	0.019	0.184
3.	Modification in the management accounting information or output	0.264*	0.336**
4.	Modification of the technical nature of a management accounting technique or system	0.134	0.265*
5.	Removal of a management accounting technique or system with no replacement	-	-

* $p < 0.05$
** $p < 0.01$

Table 47 shows the correlation between each of the five MACS change dimensions and their significance and success levels. None of the changes were categorized under the 'Removal of a management accounting technique or system with no replacement' dimension. Change through the 'Introduction of new techniques as replacement for existing ones' seems to be very significant ($r = 0.313$, $p < 0.01$) but less successful, while change through the 'Modification in the management accounting information or output' was very successful ($r = 0.336$, $p < 0.01$) and significant ($r = 0.264$, $p < 0.05$).

However changes through 'Modification of the technical nature of a management accounting technique or system' seem successful (r = 0.265, p 0.05) but less significant. There were 23 MACS sub-systems adopted in the L&W study. However, the L&W study showed only the regression results on each MACS: Planning; Controlling; Costing; Directing; and Decision-making but not on each of the 23 sub-systems.

6.2.2 Change dimensions: Correlations

By highlighting these weaknesses of the L&W study, this study extended its correlation and General Linear Model (GLM) analysis to include the five dimensions and the 23 sub-systems[10]. As will be shown in the following paragraphs, each of these dimensions and sub-systems will be influenced by different independent factors. The results indicate that management accounting change is not uniform phenomenon. Change in MACS can differ significantly in its nature, significance and causes.

As can be seen from the following Table 48, there is generally no significant correlation between MACS change dimensions and the independent variables, although some significant correlation exists. For example, there is a strong positive correlation between the 'Modification in the management accounting information or output' and

[10] Tests were conducted and showed no major problem of multicollinearity among the four independent variables.

competition ($r = 0.351$, $p < 0.01$) and organization structure ($r = 231$, $p < 0.05$). This suggests that the need for modification in management accounting information or output depends on the degree of competition experienced by an organization and by the extent to which it is decentralized.

Table 48

Pearson Correlations Matrix

MACS change dimensions and independent variables

MACS change dimensions	Independent variables			
	Competition	Organisation Structure	Size	Organizational Capacity
1. Introduction of new techniques as replacement for existing ones	0.072	0.090	-0.100	0.157
2. Introduction of new techniques where no management accounting previously existed	0.034	0.018	-0.016	0.018
3. Modification in the management accounting information or output	0.351**	0.231*	0.130	0.098
4. Modification of the technical nature of a management accounting technique or system	0.078	0.062	0.106	0.062
5. Removal of a management accounting technique or system with no replacement	-	-	-	-

* $p < 0.05$
** $p < 0.01$

6.2.3 Change dimensions: General Linear Model (GLM)

The following equation was used to test the hypothesized relationships between each MACS change dimension and the independent variables listed below:

$$\textbf{CHANDIMEN} = \alpha_0 + \beta_1\textbf{COMP} + \beta_2\textbf{ORG.STRUC} + \beta_3\textbf{SIZE} + \beta_4\textbf{CAP}$$

Where:

CHANDIMEN	=	Number of changes in each MACS change dimension
COMP	=	Intensity of competition (+)
ORG.STRUC	=	Org. structure (decentralization/centralization) (+)
SIZE	=	In (number of employees) (+)
CAP	=	Organizational capacity to learn (+)

The General Linear Model (GLM) was used to analyse regression on each MACS change dimension and the analysis is summarized and compared against the total change in MACS in Table 49. None of the change dimensions has a similar result as the total change in MACS. MACS changes due to 'Modification in the management accounting information or output' is the most associated with a more intensely competitive environment.

Table 49

Regression Analysis Matrix

MACS change dimensions and independent variables

VARIABLE	TOTAL	MACS CHANGE DIMENSIONS				
		1	2	3	4	5
COMPETITION	1.935*	0.382	-0.271	1.653**	0.240	-0.011
ORGANISATION STRUCTURE	0.809	0.133	0.247	0.282	0.138	0.015
SIZE (no. of employees)	0.0001	-0.000	0.000	0.000	0.000	0.000
ORGANISATION CAPACITY	0.606**	0.297	-0.002	0.203	0.120	-0.027
R - SQUARE	0.242	0.048	0.008	0.183	0.031	0.368
ADJ.R- SQUARE	0.204	0.001	-0.042	0.142	-0.018	0.337
F	6.386**	1.012	0.159	4.483	0.632	0.117

*$p < 0.05$, **$p < 0.01$

1 = Introduction of new techniques as replacement for existing ones
2 = Introduction of new techniques where no management accounting previously existed
3 = Modification in the management accounting information or output
4 = Modification of the technical nature of a management accounting technique or system
5 = Removal of a management accounting technique or system with no replacement

The four independent variables seem not to be significant in predicting changes in the four remaining MACS change dimensions.

6.2.4 Management accounting and control 23 sub-systems: Correlations

The following Table 50 demonstrates the Pearson correlation matrix between the four independent variables: competition; organizational structure; size; organizational capacity to learn and each MACS sub-systems.

Competition has strong correlations with all of the sub-systems except with the directing and part of the decision-making sub-systems. This suggests organisations that are concerned with their capacity to meet consumer needs and which experience a high degree of competition, change more of their MACS. Organizational structure is significantly positively related to changes in capital budgeting, allocation of manufacturing, selling and marketing cost, internal product transfer sub-systems and more frequently reported decision-making information. There is no correlation between the organisation's size as measured by the number of employees and changes in the sub-systems, while the organizational capacity to learn (number of MACS that exist in the organisation) variable has a negative significant correlation with almost all the specific types of information comprising the MACS. The negative relationship implies that a smaller number of existing systems at the end of the test period were associated with more changes. As suggested by W&S (2001, p. 456),

> ... more changes were occurring relative to a smaller base of prevailing systems, apparently contradicting the learning argument put forward ... They may have been dealing with more radical types of changes that are

less difficult to incorporate with a smaller base of existing accounting systems

Table 50

Pearson Correlations Matrix

MACS sub-systems and independent variables

MACS sub-systems	Independent variables			
	Competition	Organisation Structure	Size	Organizational Capacity
PLANNING SYSTEMS				
Budgeting	0.295**	0.102	0.063	-0.346**
Operations planning (production)	0.255*	0.173	0.086	-0.348**
Capital budgeting	0.288**	0.220*	0.093	-0.424**
Strategic planning	0.286**	0.183	0.075	-0.391**
Others	a	a	a	a
CONTROLLING SYSTEMS				
Performance measurement:				
Individual or team-based	0.237*	0.047	0.107	-0.369**
Organisational	0.190	0.026	0.088	-0.482**
Product quality	0.346**	0.160	0.133	-0.455**
Customer service	0.272**	0.110	0.120	-0.431**
Others	-0.054	-0.132	0.019	-0.021
COSTING SYSTEMS				
Direct allocation:				
Manufacturing overhead	0.285**	0.229*	-0.076	-0.366**
Selling and marketing costs	0.256*	0.271**	-0.073	-0.353**
Other overhead (e.g. administration)	0.232*	0.142	-0.067	-0.375**
Internal (divisional or dept) product transfer	0.141	0.232*	-0.086	-0.349**
Other	a	a	a	a
DIRECTING SYSTEMS				
Reward systems:				
Bonuses	0.199	0.067	0.227*	-0.458**
Pay-for-performance plans	0.179	0.105	0.193	-0.424**
Other reward systems	-0.155	-0.080	0.008	-0.091
DECISION-MAKING SYSTEMS				
Information reported more frequently	0.273**	0.247*	0.096	-0.204
Use of more non-financial measures	0.003	-0.029	0.028	-0.263*
Information reported more broadly	0.127	0.020	0.059	-0.359**
Others	a	a	a	a

* $p < 0.05$, ** $p < 0.01$

6.2.5 Management accounting and control 23 sub-systems: General Linear Model (GLM)

The following regression model was used to test the hypothesized relationships between the 23 MACS sub-systems and the four independent variables listed below:

$$\textbf{CHANSUBS} = \alpha_0 + \beta_1\textbf{COMP} + \beta_2\textbf{ORG.STRUC} + \beta_3\textbf{SIZE} + \beta_4\textbf{CAP}$$

Where:

CHANSUBS	=	Number of changes in MACS sub-system
COMP	=	Intensity of competition (+)
ORG.STRUC	=	Org. structure (decentralization/centralization) (+)
SIZE	=	In (number of employees) (+)
CAP	=	Organizational capacity to learn (+)

The General Linear Model (GLM) was used to analyse regression on changes in each MACS sub-system and the analysis is summarized and compared against the total change in MACS in the following Tables 51 - 54.

6.2.6 Planning sub-systems

The independent variables entered into the model showed small change variances (Adj. R^2) in the budgeting (18.6%), the operations (17.9%), the capital (12.5%) and the strategic planning (12.7%) systems (refer to Table 51). Similar results to the overall changes in the MACS were shown by the budgeting and the production planning sub-systems. Table 51 shows that changes in the budgeting and the production planning sub-system are best predicted by the competition faced by the organization ($r = 0.195$, $p < 0.01$; $r = 0.167$, $p < 0.01$) and the organizational capacity to learn ($r = 0.166$, $p < 0.05$; $r = 0.153$, $p < 0.05$)[11]. The changes in the strategic planning sub-system seem to significantly relate to the organizational capacity to learn ($r = 0.210$, $p < 0.01$) with an observed power of 0.798. However, the GLM results for the operation and capital budgeting sub-systems are less significant as the observed power for the significant independent variables are lesser than the acceptable level. It is possible that the significance of these independent variables could be improved by analysing a bigger sample size ($X > 92$ organisations).

[11] Variables with high observed power (more than 0.70) have significant influence and be the best predictors. The observed power for competition and organisation capacity to learn for budgeting were 0.821 and 0.708. 0.660 and 0.608 were the observed power for competition and organisation capacity

Table 51

Regression Analysis Matrix

Planning sub-systems and independent variables

VARIABLE	TOTAL	PLANNING SUB-SYSTEMS			
		BUDGETING	OPERATIONS (PRODUCTION)	CAPITAL BUDGETING	STRATEGIC PLANNING
COMPETITION	1.935*	0.195**	0.167*	0.0775	0.113
ORGANISATION STRUCTURE	0.809	0.040	0.074	0.139*	0.067
SIZE (no. of employees)	0.000	0.000	0.000	0.000	0.000
ORGANISATION CAPACITY	0.606**	0.166*	0.153*	0.135	0.210**
R - SQUARE	0.242	0.225	0.218	0.167	0.168
ADJ.R- SQUARE	0.204	0.186	0.179	0.125	0.127
F	6.386**	5.813**	5.587**	4.012**	4.049**

*p < 0.05, **p < 0.01

6.2.7 Controlling sub-systems

The GLM shows significant results for the organizational, product quality and customer service performance measurements (refer to Table 52). Higher Adj. R^2 (23.5%) than the overall results (20.4%) were noticed in the product quality sub-system. The intensity of competition and the organisational capacity to learn seem to be the best predictors for changes in the product quality performance measurement system.

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to learn for production planning. 0.556 observed power for organisation structure in the capital budgeting.

Table 52

Regression Analysis Matrix

Controlling sub-systems and independent variables

VARIABLE	TOTAL	CONTROLLING SUB SYSTEMS Performance measurements			
		INDIVIDUAL/ TEAM-BASED	ORGANI-SATIONAL	PRODUCT QUALITY	CUSTOMER SERVICE
COMPETITION	1.935*	0.140	0.123	0.246**	0.190*
ORGANISATION STRUCTURE	0.809	0.013	0.034	-0.014	-0.026
SIZE (no. of employees)	0.000	0.000	0.000	0.000	0.000
ORGANISATION CAPACITY	0.606**	0.128	0.192**	0.228**	0.203**
R - SQUARE	0.242	0.093	0.145	0.271	0.164
ADJ.R- SQUARE	0.204	0.048	0.102	0.235	0.123
F	6.386**	2.049	3.379*	7.442**	3.935**

*p < 0.05, **p < 0.01

6.2.8 Costing sub-systems

The GLM was run on each of the costing sub-systems and the results are stated in Table 53. Changes in all the costing sub-systems except the manufacturing overheads allocation could not be predicted by the independent variables. Changes in the allocation of manufacturing overhead are significantly associated with the organizational capacity to learn ($r = 0.149$, $p = 0.05$, observed power = 0.615). This significance level is however low (Adj. $R^2 = 0.09$) and can be improved by increasing the sample size ($X > 92$ organisations).

Table 53

Regression Analysis Matrix

Costing sub-systems and independent variables

VARIABLE	TOTAL	COSTING SUB-SYSTEMS			
		DIRECT ALLOCATION			INTERNAL PRODUCT TRANSFERS
		MANUFACTURING OVERHEAD	SELLING & MARKEITNG COSTS	OTHER (eg: administration)	
COMPETITION	1.935*	0.151	0.091	0.047	0.018
ORGANISATION STRUCTURE	0.809	0.044	0.084	0.062	0.059
SIZE (no. of employees)	0.000	-0.000	-0.000	-0.000	-0.000
ORGANISATION CAPACITY	0.606**	0.149*	0.123	0.098	0.149
R - SQUARE	0.242	0.133	0.106	0.053	0.079
ADJ.R- SQUARE	0.204	0.09	0.061	0.006	0.033
F	6.386**	3.076*	2.361	1.123	1.722

*p < 0.05, **p < 0.01

6.2.9 Directing sub-systems

Changes in the reward systems are best predicted by the organizational capacity to learn. Once again it is likely that the significance level of this independent variable could be improved if more than 92 organisations are analysed by the GLM[12].

[12] 0.642 and 0.678 are the observed power for organization capacity to learn to both the bonuses and pay-for-performance plans reward systems, respectively.

Table 54

Regression Analysis Matrix

Directing sub-systems and independent variables

VARIABLE	TOTAL	REWARD SYSTEMS	
		BONUSES	PAY-FOR-PERFORMANCE PLANS
COMPETITION	1.935*	0.116	0.089
ORGANISATION STRUCTURE	0.809	0.004	0.053
SIZE (no. of employees)	0.000	0.000	0.000
ORGANISATION CAPACITY	0.606**	0.202*	0.209*
R - SQUARE	0.242	0.122	0.135
ADJ.R- SQUARE	0.204	0.079	0.092
F	6.386**	2.792*	3.118*

*p < 0.05, **p < 0.01

6.2.10 Decision-making sub-systems

The use of more non-financial measures in decision-making is highly related to the organizational capacity to learn ($r = 0.206$, $p < 0.05$). While more intensely competitive environments ($r = 0.141$, $p < 0.05$) and organsiational capacity to learn ($r = 0.279$, $p < 0.01$) significantly influence the decision-making information reported more broadly within an organization[13].

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[13] 0.620 is the observed power for capacity to learn for the use of more non-financial measures. 0.518 and 0.944 are the observed power for competition and capacity to learn for the information to be reported more broadly.

Table 55

Regression Analysis Matrix

Decision-making sub-systems and independent variables

VARIABLE	TOTAL	DECISION-MAKING SUB-SYSTEMS		
		INFORMATION REPORTED MORE FREQUENTLY	USE OF MORE NON-FINANCIAL MEASURES	INFORMATION REPORTED MORE BROADLY
COMPETITION	1.935*	0.115	-0.029	0.141*
ORGANISATION STRUCTURE	0.809	0.023	0.109	0.005
SIZE (no. of employees)	0.000	0.000	0.000	0.000
ORGANISATION CAPACITY	0.606**	0.144	0.206*	0.279**
R - SQUARE	0.242	0.106	0.115	0.219
ADJ.R- SQUARE	0.204	0.061	0.070	0.180
F	6.386**	2.361	2.586*	5.614**

*$p < 0.05$, **$p < 0.01$

6.3 SECTION TWO

STATISTICAL ANALYSIS OF RESULTS:

6.3.1 Modification of the replicated model

This subsection analyses the possible improvements on the replicated L&W number of MACS change model:

$$\mathbf{NCHANGE = \alpha_0 + \beta_1 COMP + \beta_2 ORG.STRUC + \beta_3 SIZE + \beta_4 CAP}$$

Where:

NCHANGE	=	Number of changes in MACS
COMP	=	Intensity of competition (+)
ORG.STRUC	=	Org. structure (decentralization/centralization(+)
SIZE	=	In (number of employees) (+)
CAP	=	Organizational capacity to learn (+)

One motivation for models with more than one independent variable is to make predictions of the model more precise by adding other potential factors believed to affect the dependent variable. In technical terms, the goal is to increase the Adjusted R-square (Johnston, 1978; Carver and Nash, 2000). There are a number of possible variables that could improve this model. In the L&W study, a combination of four

variables showed R^2 and Adj. R^2 of 0.30 and 0.16, respectively. Therefore there are other variables which must explain about 84% (100 %– 16%) of the observed changes in MACS. The possible variables included in this study expanded on these used by L&W and were grouped into four major categories and they are as follows:

1. Organizational background
2. Management accounting functions
3. External variables
4. Internal variables

The General Linear Model (GLM) is used in the model improvement process[14]. Additional independent variables introduced aim to make predictions of the model more precise, in technical terms to increase the adjusted R-square[15]. Each of the variables in the above categories is added independently to the existing model and their F-values, R^2 and Adjusted R^2 are summarized in the respective tables.

6.3.2 Organizational background

There are six organization background variables shown in Table 56 below: organization category; type of sector; country of origin; turnover; capital employed and the number

[14] Initially, the correlation analyses between the number of changes in MACS and organizational background, management accounting function (see Appendix E), external variables (refer Table 26, p. 170) and internal variables (refer Table 29, p. 179) were conducted.
[15] http://www.unc.edu/courses/soci209/m5/m5,htm

of years the organization has been incorporated (age). The category the organization is in and the number of years the organization has been incorporated improve the model by enhancing the F-value, R^2 and Adjusted R^2. In this study organizations were categorized either as main or second board (see Appendix C).

Table 56

General Linear Model Analysis Matrix

Organisation background variables

VARIABLE	EXISTING MACS CHANGE MODEL	ORGANISATION BACKGROUND					
		ORGANISATION CATEGORY	TYPE OF SECTOR	COUNTRY ORIGIN	TURNOVER	CAPITAL EMPLOYED	AGE
COMPETITION	1.935*	2.372**	1.948*	1.964*	1.754*	1.864*	1.938*
ORGANISATION STRUCTURE	0.809	0.704	0.810	0.778	0.659	0.803	0.558
SIZE (no. of employees)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORGANISATION CAPACITY	0.606**	0.645**	0.607**	0.617**	0.579**	0.614**	0.689**
TYPE OF ORG.	-	**-2.349***	-	-	-	-	-
TYPE OF SECTOR	-	-	0.098	-	-	-	-
COUNTRY ORIGIN	-	-	-	1.976	-	-	-
TURNOVER	-	-	-	-	-0.562	-	-
CAPITAL EMPLOYED	-	-	-	-	-	-0.834	-
AGE	-	-	-	-	-	-	**-0.113****
R - SQUARE	**0.242**	**0.290**	0.242	0.245	0.278	0.279	**0.317**
ADJ.R- SQUARE	**0.204**	**0.245**	0.194	0.187	0.202	0.203	**0.274**
F	**6.386****	**6.447****	5.047**	4.229**	3.662**	3.682**	**7.332****

*p < 0.05, **p < 0.01

6.3.3 Management accounting functions

Three management accounting functions are also included in this process. The three management accounting function variables are: the number of qualified management accountants; new management accountants; and change in the chief management accountant. Referring to Table 57, none of these variables seem to improve the existing MACS model. Therefore, these variables are excluded in the process.

Table 57

General Linear Model Analysis Matrix

Management accounting functions variables

VARIABLE	EXISTING MACS CHANGE MODEL	MANAGEMENT ACCOUNTING FUNCTIONS		
		Qualified management accountants	Number of new management accountants	Change in the chief management accountants
COMPETITION	1.935*	1.814*	1.932*	1.946*
ORGANISATION STRUCTURE	0.809	0.809	0.785	0.821
SIZE (no. of employees)	0.000	-0.000	0.000	0.000
ORGANISATION CAPACITY	0.606**	0.602**	0.601**	0.601**
QUALIFIED MANAGEMENT ACCOUNTANTS	-	-3.742	-	-
NUMBER OF NEW MANAGEMENT ACCOUNTANTS	-	-	-0.579	-
CHANGE IN THE CHIEF MANAGEMENT ACCOUNTANT	-	-	-	-0.246
R - SQUARE	**0.242**	0.253	0.243	0.243
ADJ.R- SQUARE	**0.204**	0.174	0.195	0.195
F	**6.386****	3.213**	5.075**	5.059**

*p < 0.05, **p < 0.01

6.3.4 External variables

External variables are also analysed in the improvement model process (Table 58). There are three external variables: competition; market; consumer. Competition however is already part of the existing model. Both the market and consumer variables slightly improve the result of total number of changes in MACS model and therefore are included as part of the new model.

Table 58

General Linear Model Analysis Matrix

External variables

VARIABLE	EXISTING MACS CHANGE MODEL	EXTERNAL VARIABLES		
		Competition	Market	Consumers
COMPETITION	1.935*	-	0.894	1.230
ORGANISATION STRUCTURE	0.809	0.809	0.717	0.694
SIZE (no. of employees)	0.000	0.000	0.000	0.000
ORGANISATION CAPACITY	0.606**	0.606**	0.588**	0.582**
COMPETITION	-	1.935*	-	-
MARKET	-	-	**1.365**	-
CONSUMERS	-	-	-	**1.177**
R - SQUARE	**0.242**	0.242	**0.257**	**0.258**
ADJ.R- SQUARE	**0.204**	0.204	**0.210**	**0.211**
F	**6.386****	6.386**	**5.469****	**5.483****

*p < 0.05, **p < 0.01

6.3.5 Internal variables

Seven potential internal variables are analysed and included as part of the model improvement process. Organizational structure however is already part of the existing model. Table 59 below shows that cost structure seems to have a neutral impact on the model. The total number of changes in MACS is however significantly influenced by the production technology adopted and deteriorating financial performance measures.

Table 59

General Linear Model Analysis Matrix

Internal variables

VARIABLE	EXISTING MACS CHANGE MODEL	INTERNAL VARIABLES						
		1	2	3	4	5	6	7
COMPETITION	1.935*	1.935*	1.823*	1.935*	1.712*	1.893*	1.931*	1.753*
ORGANISATION STRUCTURE	0.809	-	0.461	0.809	0.235	0.597	0.479	0.498
SIZE(no. of employees)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORGANISATION CAPACITY	0.606**	0.606**	0.605**	0.606**	0.594**	0.574**	0.515*	0.551*
1. ORGANISATION STRUCTURE	-	0.809	-	-	-	-	-	-
2. MANAGERIAL POLICIES	-	-	0.516	-	-	-	-	-
3. COST STRUCTURES	-	-	-	0.00	-	-	-	-
4. PRODUCTION TECHNOLOGY	-	-	-	-	**1.020**	-	-	-
5. PROBLEM OF EXISTING TECHNIQUES	-	-	-	-	-	0.440	-	-
6. EMPLOYEES	-	-	-	-	-	-	0.660	-
7. DETERIORATION OF FINANCIAL PERFORMANCE	-	-	-	-	-	-	-	**0.737**
R - SQUARE	**0.242**	0.242	0.245	0.242	**0.265**	0.247	0.251	**0.254**
ADJ.R- SQUARE	**0.204**	0.204	0.197	0.204	**0.218**	0.199	0.203	**0.207**
F	**6.386****	6.386**	5.135**	6.386**	**5.683****	5.170**	5.288**	**5.387****

*p < 0.05, **p < 0.01

6.3.6 New variables in the MACS change model

As discussed in the previous paragraphs, variables from the four categories that statistically improve the total number of changes in MACS are added to this new model. The additional variables included in the new model are: number of years the organization has been incorporated (-); organisational category (-); market (+); consumer (+); production technology (+); deterioration of financial performance (+). None of these additional variables are from the management accounting function data.

6.3.7 Number of years incorporated [AGE] (-)

There was a negative relationship between the number of changes in MACS and the number of years the organisation has been incorporated. This suggests that the number of changes in MACS are greater in the 'newer' incorporated organizations as compared to 'older' organizations.

6.3.8 Organisation category [TYPE] (-)

There was also a negative relationship between the number of changes in MACS and the category in which the organisation is located. This study grouped the organisations into two categories: main and second board organizations (see Appendix C). Based on the amount of issued and paid-up capital, shareholding

spread and profit performance, the main board organizations are larger as compared to the second board organizations. The negative relationship suggests that there are more changes in MACS in second board organisations as compared to main board organizations. In other words, 'smaller' organizations are exposed to more frequent MACS changes as compared to 'larger' organizations.

6.3.9 Market [MARKET] (+)

There was a positive relationship between the number of changes in MACS and the market in which the organisation operates as organisation's success depends on its ability and flexibility in exploiting the market. These uncertain circumstances may demand more management accounting information to be created. An organisation's management accounting system therefore needs to be proactive in the search for continuous improvement.

6.3.10 Consumer [CONS] (+)

There was a positive relationship between the number of changes in MACS and the consumer variable. Consumer is another fundamental and can be a 'core' variable which has repercussions for management accounting system change. The relationship suggests that more changes in MACS occur in organisations

that are concerned with their capacity to meet consumer needs. This could lead to more non-financial measures being introduced by these organizations.

6.3.11 Production technology [PRODTECH] (+)

There was a positive relationship between the number of changes in MACS and the production technology. This suggests that the adoption of new and high technology manufacturing techniques can have repercussions for management accounting change. The products produced with this technology are basically more complex and have a shorter life cycle. The change in the product life cycle may have notable effects on management accounting, for example on the relevant range and cost- volume- profit (CVP) analysis.

6.3.12 Deterioration of financial performance [DETER] (+)

There was also a positive relationship between the number of changes in MACS and deteriorating financial performance. This suggests that poor performance creates a demand for new information i.e. there is a search for new information to provide a solution to the organisation's problems.

6.3.13 Correlations

The correlation and Cronbach alpha reliability coefficients of the new variables are shown in Table 60 below. A review of the correlation matrix indicates that all the independent variables except size, number of years incorporated (age) and type of organisation are positively significantly related to the number of changes in MACS. The number of years an organization has been incorporated (age) and type of organization however are negatively significantly correlated to the number of changes in MACS. Several positive correlations among the independent variables are also demonstrated in this table. For example, there are very strong correlations between the organization's variables (age and type of organisation) and among all the external variables (competition, market and consumer). Correlations among the independent variables suggest that further multi-collinearity tests need to be conducted.

Table 60

Correlations and reliabilities matrix

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Number of changes	NA										
2. Competition	0.336**	0.909									
3. Organisation structure	0.280**	0.574**	0.955								
4. Size (no. of employees)	0.079	0.005	-0.058	NA							
5. Organisational capacity	0.253*	-0.075	-0.009	0.049	NA						
6. Age	-0.248*	0.795**	0.514**	0.051	-0.020	NA					
7. Type of organization	-0.063*	0.688**	0.481**	0.069	0.017	0.742**	NA				
8. Market	0.379**	0.473**	0.631**	-0.048	0.008	0.415**	0.537**	0.933			
9. Consumer	0.335**	0.428**	0.551**	-0.052	0.153	0.362**	0.332**	0.597*	0.907		
10. Production Technology	0.314**	-0.103	-0.141	-0.094	0.117	-0.062	-0.040	-0.063	-0.067	0.965	
11. Deterioration of financial performance	0.310**	-0.221*	-0.076	-0.120	-0.055	-0.198	-0.135	-0.115	-0.085	0.062	0.973

* $p < 0.05$, ** $p < 0.01$

6.3.14 Modified model: General Linear Model (GLM)

Correlations among the variables are used in the GLM to test the hypothesized relationships between the dependent and independent variables discussed above. Therefore, the modified total number of change in MACS model is as follows:

$$\begin{aligned} \textbf{NCHANGE} = {} & \alpha_0 + \beta_1\textbf{COMP} + \beta_2\textbf{ORG.STRUC} + \beta_3\textbf{SIZE} + \beta_4\textbf{CAP} + \\ & \beta_5\textbf{AGE} + \beta_6\textbf{TYPE} + \beta_7\textbf{MARKET} + \beta_8\textbf{CONS} + \\ & \beta_9\textbf{PRODTECH} + \beta_{10}\textbf{DETER} \end{aligned}$$

Where:

NCHANGE	=	Number of changes in MACS
COMP	=	Intensity of competition (+)
ORG.STRUC	=	Org. structure (decentralization) (+)
SIZE	=	In (number of employees) (+)
CAP	=	Organizational capacity to learn (+)
AGE	=	Number of years organization has been incorporated (-)
TYPE	=	Organisational category (-)
MARKET	=	Market (+)
CONS	=	Consumer (+)
PRODTECH	=	Production technology (+)
DETER	=	Deterioration of financial performance (+)

The GLM results and related statistical tests were conducted and summarized as follows:

1. The following univariate analysis of variance in Table 61 shows that the model above is explained by at least one ($\geq$ 1) of the ten independent variables. The significant relationships between all the dependent and independent variables in the model is well explained by its F- test result (F = 5.259) and its associated probability which is less than 0.05 level (p = 0.000). Organizational capacity to learn, number of years it has been incorporated (age) and organizational category seem to have acceptable observed power levels of 0.921, 0.887 and 0.756, respectively. The other variables with lower observed power values however could be improved by increasing their sample size (X > 92). A similar study conducted on a bigger sample size will probably improve the overall results on R-squared and Adjusted R-squared.

Table 61

Tests of Between-Subjects Effects

Dependent Variable: Total number of change in MACS

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Observed Power
Corrected Model	913.102	10	91.310	5.259	.000	1.000
Intercept	82.202	1	82.202	4.734	.033	.574
COMPETITION	15.369	1	15.369	.885	.350	.153
ORG. STRUCTURE	2.900	1	2.900	.167	.684	.069
SIZE(no. of employees)	7.169	1	7.169	.413	.523	.097
ORG. CAPACITY	202.589	1	202.589	11.667	**.001**	**.921**
AGE	179.383	1	179.383	10.331	**.002**	**.887**
ORG. CATEGORY	125.646	1	125.646	7.236	**.009**	**.756**
MARKET	19.414	1	19.414	1.118	.294	.181
CONSUMER	3.039	1	3.039	.175	.677	.070
PROD. TECHNOLOGY	24.682	1	24.682	1.421	.237	.218
DETERIORATION FIN.	4.411	1	4.411	.254	.616	.079
Error	1284.945	74	17.364			
Total	10186.000	85				
Corrected Total	2198.047	84				

Computed using alpha = .05

R Squared = .415 (Adjusted R Squared = .336)

2. The following Table 62 summarizes the parameter estimates for the dependent and independent variables. The modified model resulted in 33.6% (Adj. R^2) of the number of changes in MACS being explained by the ten independent

variables. Hence, 66.4% (100.00 – 33.6) of the number of changes in MACS is explained by other 'undiscovered' variables. It shows that changes in MACS and the capacity to learn is positively and significantly associated. Number of years incorporated (age) and organizational category are negatively and significantly associated.

Table 62

Parameter Estimates

Dependent Variable: Total number of change in MACS

Parameter	B	Std. Error	t	Sig.
Intercept	-6.565	3.553	-1.848	0.069
Competition	1.018	1.082	0.941	0.350
Organisation structure	-0.284	0.695	-0.409	0.684
Size (no. of employees)	0.000	0.000	0.643	0.523
Org. capacity to learn	**0.680**	0.199	3.416	**0.001**
Age	**-.119**	0.037	-3.214	**0.002**
Org. category	**-2.590**	0.963	-2.690	**0.009**
Market	1.172	1.109	1.057	0.294
Consumer	0.419	1.003	0.418	0.677
Production technology	0.816	0.684	1.192	0.237
Deterioration of financial performance	0.319	0.634	0.504	0.616
R-Squared	0.415			
Adjusted R-Squared	0.336			
F	5.259**			

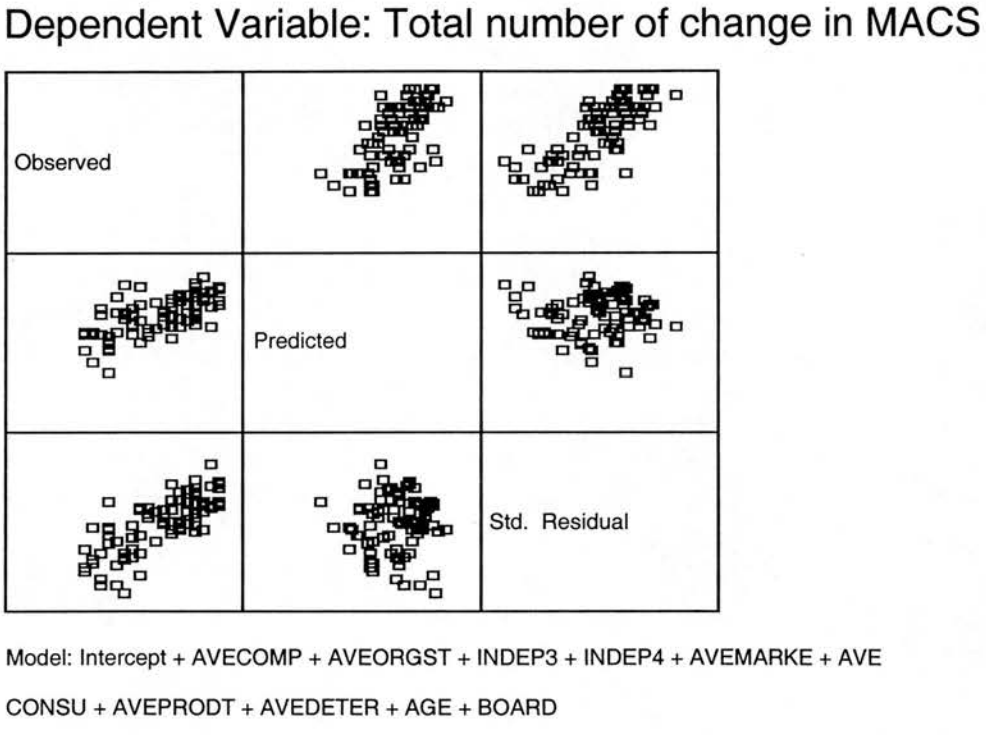
Computed using alpha = 0.05

3. The residual plot below of the predicted against standard residual shows that the residuals are randomly distributed (randomness) and identically distributed [N $(0, \alpha_2)$].

FIGURE 5

Residual plots - Modified model

(Between Predicted and standard)



Model: Intercept + AVECOMP + AVEORGST + INDEP3 + INDEP4 + AVEMARKE + AVE CONSU + AVEPRODT + AVEDETER + AGE + BOARD

4. The Kolmogorov-Smirnov test of normality in Table 63 also shows that the residual plot is normally distributed with the p-value of 0.084 (eg: > 0.05).

Table 63

Tests of Normality

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Residual for total change in MACS	.090	85	.084

a Lilliefors Significance Correction

5. The absence of multicollinearity is essential to a general linear model and the Variance Inflation Factor (VIF) is a common way for detecting multicollinearity among the independent variables (predictors). Table 64 below shows there is no multicollinearity problem among the independent variables as VIF for each of the ten independent variables is small (less than 4). The low Adjusted R^2 (33.6%) resulting from the modified model suggested that the multicollinearity is not a problem (HassabElnaby *et al.*, 2003). It can be concluded that the exogenous (independent) variables themselves are not highly correlated with each other.

Table 64

Coefficients

Model		Collinearity Statistics	
		Tolerance	VIF
1	Competition	0.282	3.547
	Organisation structure	0.454	2.205
	Size (no. of employees)	0.949	1.054
	Capacity to change	0.893	1.120
	Age	0.929	1.077
	Org. category	0.902	1.108
	Market	0.269	3.722
	Consumer	0.353	2.830
	Production technology	0.438	2.282
	Deterioration of financial performance	0.560	1.787

a Dependent Variable: Total number of change in MACS

6.4 SECTION THREE

STATISTICAL ANALYSIS OF RESULTS:

6.4.1 Analysis on modified MACS model

This sub-section further analyses the modified total number of changes in the MACS model from three aspects. The three aspects are the five management accounting and control systems (planning, controlling, costing, directing, decision-making); the identified five change dimensions; and the MACS 23 sub-systems. The main objective of this section is to assess whether the factors associated with overall change in MACS are similar to the factors associated with overall change in these three aspects. GLM was run based on the following modified model:

$$\begin{aligned} \text{NCHANGE} = {} & \alpha_0 + \beta_1\text{COMP} + \beta_2\text{ORG.STRUC} + \beta_3\text{SIZE} + \beta_4\text{CAP} \\ & + \beta_5\text{AGE} + \beta_6\text{TYPE} + \beta_7\text{MARKET} + \beta_8\text{CONS} + \\ & \beta_9\text{PRODTECH} + \beta_{10}\text{DETER} \end{aligned}$$

Where:

NCHANGE	=	Number of changes in MACS
COMP	=	Intensity of competition (+)
ORG.STRUC	=	Org. structure (decentralization/centralization(+)
SIZE	=	In (number of employees) (+)

CAP	=	Organizational capacity to learn (+)
AGE	=	Number of years organization has been incorporated (-)
TYPE	=	Organisational category (-)
MARKET	=	Market (+)
CONS	=	Consumer (+)
PRODTECH	=	Production technology (+)
DETER	=	Deterioration of financial performance (+)

6.4.2 Modified model: MACS

The dependent variable in the above model is changed from total number of changes in MACS to number of changes in each of the five systems: Planning; Controlling; Costing; Directing; and Decision-making.

$$\text{NCHMACS} = \alpha_0 + \beta_1\text{COMP} + \beta_2\text{ORG.STRUC} + \beta_3\text{SIZE} + \beta_4\text{CAP} + \beta_5\text{AGE} + \beta_6\text{TYPE} + \beta_7\text{MARKET} + \beta_8\text{CONS} + \beta_9\text{PRODTECH} + \beta_{10}\text{DETER}$$

Where:

NCHMACS	=	Number of changes in Planning/ Controlling/ Costing/ Directing/ Decision-making
COMP	=	Intensity of competition (+)
ORG.STRUC	=	Org. structure (decentralization/centralization(+)
SIZE	=	In (number of employees) (+)
CAP	=	Organizational capacity to learn (+)
AGE	=	Number of years organization has been incorporated (-)
TYPE	=	Organisational category (-)
MARKET	=	Market (+)
CONS	=	Consumer (+)
PRODTECH	=	Production technology (+)
DETER	=	Deterioration of financial performance (+)

The GLM Table 65 shows results of the above model on each management accounting and control sub-system. The revised model seems to enhance the adjusted R- square and R - square for all components of MACSs. None of the five MACS are however similar to the overall GLM results. Both the organizational capacity to learn and the number of years an organization has been incorporated show statistically significant coefficients for planning and decision-making components. Changes in the other systems are best predicted by the organisational capacity to learn.

Table 65

General Linear Model Results

Management accounting and control sub-systems

VARIABLE	MACS MODIFIED CHANGE MODEL	PLANNING	CONTROLLING	COSTING	DIRECTING	DECISION-MAKING
1. COMPETITION	1.018	0.315	0.764	-0.274	0.159	0.067
2. ORGANISATION STRUCTURE	-0.284	-0.023	-0.211	-0.033	-0.068	-0.009
3. SIZE (no. of employees)	0.000	0.000	0.000	0.000	0.000	0.000
4. ORGANISATION CAPACITY	0.680**	0.632**	0.804**	0.604*	0.430*	0.755**
5. AGE	-0.119**	-0.036**	-0.025*	-0.023	-0.004	-0.030**
6. TYPE	-2.590**	-0.477	-0.504	-0.926*	-0.378	-0.274
7. MARKET	1.172	0.107	0.281	0.571	0.0894	0.102
8. CONSUMER	0.419	0.218	-0.394	0.224	0.0949	0.275
9. PRODUCTION TECHNOLOGY	0.816	0.171	0.417	0.110	0.191	-0.025
10. DETERIORATION OF FINANCIAL PERFORMANCE	0.319	0.287	-0.178	0.228	-0.056	0.047
MODIFIED MODEL						
R - SQUARE	0.415	0.476	0.317	0.238	0.242	0.338
ADJ.R- SQUARE	0.336	0.405	0.224	0.135	0.139	0.248
F	5.259**	6.729**	3.431**	2.316*	2.361*	3.777**
ORIGINAL MODEL						
R – SQUARE	0.242	0.303	0.229	-	0.167	0.206
ADJ.R – SQUARE	0.204	0.268	0.190	-	0.125	0.166

*p < 0.05, **p < 0.01

6.4.3 Modified model: Change dimensions

The dependent variable is changed from total number of changes in MACS to number of changes in each of the five change dimensions.

$$\text{CHANDIMEN} = \alpha_0 + \beta_1\text{COMP} + \beta_2\text{ORG.STRUC} + \beta_3\text{SIZE} + \beta_4\text{CAP} + \beta_5\text{AGE} + \beta_6\text{TYPE} + \beta_7\text{MARKET} + \beta_8\text{CONS} + \beta_9\text{PRODTECH} + \beta_{10}\text{DETER}$$

Where:

CHANDIMEN	=	Number of changes in each MACS change dimensions
COMP	=	Intensity of competition (+)
ORG.STRUC	=	Org. structure (decentralization/centralization) (+)
SIZE	=	In (number of employees) (+)
CAP	=	Organizational capacity to learn (+)
AGE	=	Number of years organization has been incorporated (-)
TYPE	=	Organisational category (-)
MARKET	=	Market (+)
CONS	=	Consumer (+)
PRODTECH	=	Production technology (+)
DETER	=	Deterioration of financial performance (+)

The GLM Table 66 shows results of the above model for each of the five change dimensions. None of the MACS are similar to the overall GLM results. The model is not significant and cannot be associated directly with all the MACS change dimensions except changes through 'Modification in the management accounting information or output'.

Table 66

General Linear Model Matrix

MACS change dimensions and independent variables

VARIABLE	MACS MODIFIED CHANGE MODEL	MACS CHANGE DIMENSIONS				
		1	2	3	4	5
1. COMPETITION	1.018	0.557	0.236	0.741	-0.439	0.015
2. ORGANISATION STRUCTURE	-0.284	-0.276	-0.110	0.356	-0.301	0.028
3. SIZE (no. of employees)	0.000	-0.000	0.000	0.000	0.000	0.000
4. ORGANISATION CAPACITY	0.680**	0.279	0.043	0.231	0.145	-0.026
5. AGE	-0.119**	-0.012	-0.010	-0.061	-0.052	0.001
6. TYPE	-2.590**	-0.745	-1.377	0.253	-0.604	-0.000
7. MARKET	1.172	-0.325	-0.269	0.729	0.845	-0.019
8. CONSUMER	0.419	0.039	-0.258	0.737	0.085	-0.000
9. PRODUCTION TECHNOLOGY	0.816	0.246	0.698	-0.502	0.347	0.004
10. DETERIORATION OF FINANCIAL PERFORMANCE	0.319	0.542	-0.179	-0.0849	0.008	-0.016
R - SQUARE	0.415	0.073	0.116	0.249	0.121	0.042
ADJ.R- SQUARE	0.336	-0.052	-0.003	0.148	0.002	0.003
F	5.259**	0.584	0.972	2.456*	1.014	0.530

*p < 0.05, **p < 0.01

1 = Introduction of new techniques as replacement for existing ones
2 = Introduction of new techniques where no management accounting previously existed
3 = Modification in the management accounting information or output
4 = Modification of the technical nature of a management accounting technique or system
5 = Removal of a management accounting technique or system with no replacement

6.4.4 Modified model: Management accounting and control sub-systems

In this sub-section the dependent variable is changed from total number of changes in MACS to number of changes in each of the replicated 23 management accounting and control sub-systems.

$$\mathbf{CHANSUBS} = \alpha_0 + \beta_1\mathbf{COMP} + \beta_2\mathbf{ORG.STRUC} + \beta_3\mathbf{SIZE} + \beta_4\mathbf{CAP} + \beta_5\mathbf{AGE} + \beta_6\mathbf{TYPE} + \beta_7\mathbf{MARKET} + \beta_8\mathbf{CONS} + \beta_9\mathbf{PRODTECH} + \beta_{10}\mathbf{DETER}$$

Where:

NCHANGE = Number of changes in MACS sub-systems

COMP = Intensity of competition (+)

ORG.STRUC = Org. structure (decentralization/centralization(+)

SIZE = In (number of employees) (+)

CAP = Organizational capacity to learn (+)

AGE = Number of years organization has been incorporated (-)

TYPE	=	Organisational category (-)
MARKET	=	Market (+)
CONS	=	Consumer (+)
PRODTECH	=	Production technology (+)
DETER	=	Deterioration of financial performance (+)

The following GLM tables show results of the above model on each of the 23 management accounting and control sub-systems. They are however discussed according to their respective sub-systems.

6.4.5 Planning sub-systems

Table 67 shows that none of the changes in planning sub-systems is consistent with the overall result of the modified model. The revised model however enhances the R-square and adjusted R- square for all the planning sub-systems. Changes in all the planning sub-systems are negatively significant ($p < 0.01$) with the organizational capacity to learn. Organisational capacity to learn is represented by the number of MACS that exists in the organisations. It is suggested that the lesser the number of planning sub-systems that exist, the more changes there will be in these sub-systems. The number of years an organization has been incorporated is also negatively significantly correlated with the number of changes in budgeting and capital budgeting sub-systems. This

suggests that newly incorporated organizations change these sub-systems more frequently as compared to earlier incorporated organisations.

Table 67

General Linear Model Matrix

Planning sub-systems and independent variables

VARIABLE	MACS MODIFIED CHANGE MODEL	PLANNING SUB-SYSTEMS			
		BUDGETING	OPERATIONS	CAPITAL BUDGETING	STRATEGIC PLANNING
1. COMPETITION	1.018	0.702*	0.129	-0.0664	0.212
2. ORGANISATION STRUCTURE	-0.284	0.0509	0.167	-0.0653	-0.070
3. SIZE (no. of employees)	0.000	0.000	0.000	0.000	0.000
4. ORGANISATION CAPACITY	0.680**	-0.823**	-0.983**	-1.262**	-1.218**
5. AGE	-0.119**	-0.049**	-0.004	-0.031**	-0.021
6. TYPE	-2.590**	-0.012	-0.019	-0.309	-0.785*
7. MARKET	1.172	-0.331	0.510	0.216	-0.071
8. CONSUMER	0.419	0.140	-0.426	0.302	0.626
9. PRODUCTION TECHNOLOGY	0.816	-0.330	0.035	0.209	0.028
10. DETERIORATION OF FINANCIAL PERFORMANCE	0.319	0.147	0.070	0.277	0.180
MODIFIED MODEL					
R – SQUARE	0.415	0.475	0.293	0.464	0.423
ADJ.R- SQUARE	0.336	0.404	0.197	0.392	0.345
F	5.259**	6.692**	3.061**	6.418**	5.421**
ORIGINAL MODEL					
R – SQUARE					
ADJ. R - SQUARE	0.242	0.225	0.218	0.167	0.168
	0.204	0.186	0.178	0.125	0.127

*p < 0.05, **p < 0.01

6.4.6 Controlling sub-systems

Table 68 shows that none of the controlling sub-systems showed similar results as the overall result of the modified model. The revised model however enhances the R-square and adjusted R-square for all the controlling sub-systems. Negative significant coefficients for organisational capacity to learn and changes in all the controlling sub-systems. This suggests that where there is a lesser number of controlling sub-systems exist more changes in these sub-systems are prevalent.

Table 68

General Linear Model Matrix

Controlling sub-systems and independent variables

VARIABLE	MACS MODIFIED CHANGE MODEL	CONTROLLING SUB-SYSTEMS Performance measurements			
		INDIVIDUAL /TEAM-BASED	ORGANI-SATIONAL	PRODUCT QUALITY	CUSTOMER SERVICE
1. COMPETITION	1.018	0.737	0.295	0.385	0.351
2. ORGANISATION STRUCTURE	-0.284	-0.184	-0.155	-0.0306	-0.205
3. SIZE (no. of employees)	0.000	0.000	0.000	0.000	0.000
4. ORGANISATION CAPACITY	0.680**	-0.681**	-1.186**	-1.064**	-1.114**
5. AGE	-0.119**	-0.027*	-0.032**	-0.014	-0.008
6. TYPE	-2.590**	-0.465	-0.442	-0.116	-0.518
7. MARKET	1.172	-0.206	0.0317	0.381	0.488
8. CONSUMER	0.419	-0.216	-0.013	0.008	-0.289
9. PRODUCTION TECHNOLOGY	0.816	0.288	0.239	0.041	0.445
10. DETERIORATION OF FINANCIAL PERFORMANCE	0.319	-0.068	-0.036	-0.061	-0.137
MODIFIED MODEL					
R - SQUARE	0.415	0.331	0.458	0.409	0.381
ADJ.R- SQUARE	0.336	0.241	0.385	0.329	0.297
F	5.259**	3.666**	6.266**	5.112**	4.557**
ORIGINAL MODEL					
R – SQUARE	0.242	-	0.145	0.271	0.164
ADJ. R - SQUARE	0.204	-	0.102	0.235	0.123

*p < 0.05, **p < 0.01

6.4.7 Costing sub-systems

Table 69 shows that none of the changes in costing sub-systems is consistent with the results of the overall modified model. The revised model however enhances the R-square and adjusted R- square for all the costing sub-systems. All the costing sub-systems are negatively significantly correlated ($p < 0.01$) with the number of systems that exist in the organisation. The number of years an organization has been incorporated is also negatively significantly ($p < 0.05$) correlated with the number of changes in manufacturing, other overhead allocations and the internal product transfers sub-systems. This suggests that newly incorporated organizations change these sub-systems more frequently.

Table 69

General Linear Model Matrix

Costing sub-systems and independent variables

VARIABLE	MACS MODIFIED CHANGE MODEL	COSTING SUB-SYSTEMS			
		DIRECT ALLOCATION			INTERNAL PRODUCT TRANSFERS
		MANUFACTURING OVERHEAD	SELLING & MARKEITNG COSTS	OTHER eg: administration	
1. COMPETITION	1.018	0.020	-0.370	-0.033	-0.465
2. ORGANISATION STRUCTURE	-0.284	0.140	0.204	-0.159	0.023
3. SIZE (no. of employees)	0.000	-0.000	-0.000	-0.000	-0.000
4. ORGANISATION CAPACITY	0.680**	-0.869**	-0.905**	-1.120**	-1.586**
5. AGE	-0.119**	-0.003*	-0.018	-0.029*	0.034*
6. TYPE	-2.590**	-0.460	-0.425	-0.530	-0.387
7. MARKET	1.172	0.228	0.440	0.633	0.352
8. CONSUMER	0.419	0.639	0.655	0.115	0.026
9. PRODCUTION TECHNOLOGY	0.816	-0.312	-0.175	-0.013	0.523
10. DETERIORATION OF FINANCIAL PERFORMANCE	0.319	0.0831	0.102	0.0386	0.119
MODIFIED MODEL					
R - SQUARE	0.415	0.378	0.398	0.467	0.539
ADJ.R- SQUARE	0.336	0.294	0.316	0.395	0.476
F	5.259**	4.502**	4.885**	6.486**	8.639**
ORIGINAL MODEL					
R – SQUARE	0.242	0.133	-	-	-
ADJ. R - SQUARE	0.204	0.09	-	-	-

*p < 0.05, **p < 0.01

6.4.8 Directing sub-systems

The revised model enhances the R-square and adjusted R- square for all the directing sub-systems. Table 70 shows there are however negatively significant ($p < 0.01$) coefficients between the number of systems that exists and the number of changes in both the reward systems (bonuses and pay-for-performance plans). There is also a positively significant ($r = 0.00011$, $p < 0.05$) coefficient for the changes in the bonuses reward systems and the organisation's number of employees. This suggests, that organizations that employ more employees seem to change their reward systems more frequently, especially their bonus payments.

Table 70

General Linear Model Matrix

Directing sub-systems and independent variables

VARIABLE	MACS MODIFIED CHANGE MODEL	REWARD SYSTEMS	
		BONUSES	PAY-FOR-PERFORMANCE PLANS
1. COMPETITION	1.018	0.403	0.337
2. ORGANISATION STRUCTURE	-0.284	-0.301	-0.233
3. SIZE (no. of employees)	0.000	0.000*	0.000
4. ORGANISATION CAPACITY	0.680**	-0.970**	-1.102**
5. AGE	-0.119**	-0.014	-0.006
6. TYPE	-2.590**	-0.298	-0.311
7. MARKET	1.172	0.115	0.179
8. CONSUMER	0.419	-0.168	-0.142
9. PRODCUTION TECHNOLOGY	0.816	0.478	0.466
10. DETERIORATION OF FINANCIAL PERFORMANCE	0.319	-0.128	-0.234
MODIFIED MODEL			
R - SQUARE	0.415	0.277	0.241
ADJ.R- SQUARE	0.336	0.179	0.139
F	5.259**	2.829**	2.354*
ORIGINAL MODEL			
R –SQUARE	0.242	0.122	0.135
ADJ. R - SQUARE	0.204	0.079	0.092

*p < 0.05, **p < 0.01

6.4.9 Decision-making sub-systems

The revised model enhances the R-square and adjusted R- square for all the decision-making sub-systems. Table 71 shows that changes in all decision-making sub-systems seem to have a negative significant ($p < 0.01$) coefficient with the number of years the organization has been incorporated. For example, use of more non-financial decision-making measures are mostly adopted by newly incorporated organisations. Use of more and broadly reported non-financial decision-making measures are more applicable to organizations that have a smaller number of decision-making sub-systems.

Table 71

General Linear Model Matrix

Decision-making sub-systems and independent variables

VARIABLE	MACS MODIFIED CHANGE MODEL	DECISION-MAKING SUB-SYSTEMS		
		INFORMATION REPORTED MORE FREQUENTLY	USE OF MORE NON-FINANCIAL MEASURES	INFORMATION REPORTED MORE BROADLY
1. COMPETITION	1.018	-0.099	-0.089	0.327
2. ORGANISATION STRUCTURE	-0.284	0.116	-0.179	0.070
3. SIZE (no. of employees)	0.000	0.000	-0.000	0.000
4. ORGANISATION CAPACITY	0.680**	-0.0515	-1.034**	-1.081**
5. AGE	-0.119**	-0.032**	-0.037**	-0.037**
6. TYPE	-2.590**	-0.085	-0.280	0.009
7. MARKET	1.172	0.468	-0.024	0.007
8. CONSUMER	0.419	0.181	0.414	0.240
9. PRODUCTION TECHNOLOGY	0.816	0.029	0.083	-0.140
10. DETERIORATION OF FINANCIAL PERFORMANCE	0.319	-0.001	0.036	-0.286
MODIFIED MODEL				
R - SQUARE	0.415	0.227	0.282	0.290
ADJ.R- SQUARE	0.336	0.123	0.185	0.194
F	5.259**	2.175*	2.907**	3.018**
ORIGINAL MODEL				
R –SQUARE	0.242	-	0.115	0.219
ADJ. R – SQUARE	0.204	-	0.070	0.180

*p < 0.05, **p < 0.01

6.5 SUMMARY

The L&W study was extended in several ways and produced a number of interesting results. Only one type of change, 'Modification in the management accounting information or output' was both significant and successful and this change was strongly associated with more intensely competitive environments. This suggests that an organisation in an intensely competitive environment is more likely to have their MACS information and output modified in a substantial way. Similar tests on 23 management accounting sub-systems showed that most changes, except for costing systems, were best predicted by the four L&W replicated independent variables.

Comparisons between L&W, W&S and this study showed that the best independent factors to explain the number of changes in MACS depends on the different environmental situations. It is therefore suggested that there is no single best set of independent factors to represent the number of changes in MACS in a general sense. The L&W model shows that the proportion of changes in MACS unexplained by their selected independent variables is at a level of 84%. There are therefore likely to be other potential explanation factors and consequently there is scope for the model to be improved.

This was done by adding six independent variables to the original L&W model and this modified model showed that the number of changes in MACS is best predicted by the

organizational capacity to learn but negatively associated with the number of years an organization has been incorporated and by the organisational category (first and second board on the KLSE). This suggests that the more MACS that exist in an organization and the more 'newly' incorporated the organisations, the more the chances that they are exposed to changes. 'Newly' incorporated organizations tend to change their MACS more frequently and appear to be exposed to lesser resistance to change problems than are 'earlier' incorporated organizations. The modified model also showed a negative relationship between the number of changes in MACS and the organisational category. It is therefore suggested that the second board (smaller) organization see more changes in their MACS as compared to the main board (larger) organizations. More frequent changes are therefore associated with organizations which are 'newly incorporated' and smaller and which have a larger number of MACS. This further supports the earlier findings that the number of changes in MACS depends on different environmental situations.

The extended analysis therefore reveals that change is a complex event involving multiple influences which may well change over time, across countries and across organizations. The treatment of management accounting change as a homogeneous event by researchers is also inadvisable. Different types of change exhibit different patterns of significance and success and are influenced by different factors.

Finally identification of the drivers of change remains a challenge for researchers. This study has shown how the causal factors of L&W and W&S could be supplemented in a way which doubled the explanatory power of the model developed to reflect the causes of change. However even this enhanced model leaves the majority of change unexplained.

CHAPTER SEVEN

CASE STUDY COMPANY – MINHO (M) BERHAD

7.1 INTRODUCTION

This chapter is organized into six subsections. The first subsection presents a review of the background of the case study company, Minho (M) Berhad (herafter Minho). This is followed by a section on changes in the case study company's management accounting systems, followed by a section on the management accounting function. Section four details the factors that caused the changes. The Minho's experiences of resistance to change is then presented. Finally a summary review section follows.

7.2 BACKGROUND

Minho was incorporated on 16th July 1990 in Malaysia as a private limited company. It was converted into a public company on 12th February 1992. It was known as Vinco Timber Industries Sdn Bhd and changed its name to Minho (M) Sdn Bhd following the conversion. The company was listed under the Main Board (Industrial Products) with the Kuala Lumpur Stock Exchange (KLSE) on 28th April 1993.

Minho Berhad Group consists of Minho (M) Berhad and sixteen subsidiaries. There are seven major business activities in Minho. Table 72 shows the details of the subsidiaries' country of incorporation, equity interest (as for the year 2001) and their principal activities:

Table 72

Minho's Subsidiaries Activities

No.	Name of company	Country of incorporation	Equity interest 2001 (%)	Principal Activities
1	Syarikat Minho Kilning Sdn. Bhd.	Malaysia	100	Timber kiln drying and its related activities
2	Syarikat Vinco Timber Sdn. Bhd.	Malaysia	100	Timber kiln drying, preserving treatment and its related activities
3	Syarikat Woodvation Sdn. Bhd.	Malaysia	100	Dealing in sawn timber
4	Costraco Sdn. Bhd.	Malaysia	51	Export of processed timber products
5	Indah Wood Products Sdn. Bhd.	Malaysia	51	Export of processed timber products
6	Victory Enterprise Sdn. Bhd.	Malaysia	100	Manufacturing, exporting and dealing in moulded timber and its related products
7	Haitien Sdn. Bhd.	Malaysia	100	Dormant
8	Indah Paper Industries Sdn. Bhd.	Malaysia	100	Manufacturing and distribution of industrial paper bags
9	Lionvest Corporation (Pahang) Sdn. Bhd.	Malaysia	100	Exploitation of timber concessions, trading in timber logs and operation of an integrated of an integrated timber complex
10	Lionvest Trading (UK) Limited	United Kingdom	100	Dealing in wholesale supply of wood
11	Lionvest Marketing Sdn. Bhd.	Malaysia	100	Dealing in timber and its related products
12	Lionvest Timber Industries Sdn. Bhd.	Malaysia	51	Sawmilling, dealing in timber and its related products
13	Abadi Canggih Sdn. Bhd.	Malaysia	51	Dormant
14	Idaman Heights Sdn. Bhd.	Malaysia	51	Dealing in logs, sawn timber and its related products
15	Magnetic Potentials Sdn. Bhd	Malaysia	100	Dormant
16	PPP Services Sdn. Bhd.	Malaysia	70	Operations of jetty services

Out of these 16 subsidiaries, three are dormant subsidiaries and they are: Haitien Sdn Bhd; Abadi Canggih Sdn Bhd and Magnetic Potentials Sdn Bhd. The other remaining 14 are considered as 'active' subsidiaries and their principal activities are explained in the following paragraphs:

7.2.1 Kiln drying and chemical preservative treatment

Minho Kilning Sdn. Bhd and Vinco Timber Industries Sdn. Bhd. provide kiln drying and chemical preservative treatments. Kiln Drying is defined as the process of reducing the moisture content in raw timber. The process prevents the timber from further shrinkage and warping. Chemical Preservative Treatment is a process which eliminates fungus and bacteria that resides within the timber. This is to ensure that the processed timber will have a longer life span. These two activities are considered essential processes for all raw timber before they can be manufactured into finished wood products such as timber mouldings, doors and furniture parts.

During the mid 1980's, in anticipation of strong demand for Kiln Dried and Treated timber products particularly for the export markets, Minho expanded its Kiln Drying facilities and the capacity of its storage sheds. These facilities are all centrally located on industrial land in Klang which covers an area of approximately 80 acres. The above mentioned Kiln Drying facilities were also equipped with two boilers with turbine

engines to generate steam and electricity for the factory operations. Presently, the Kiln Drying division is capable of generating a maximum production capacity of 40,000 tons per month from 171 units of Kiln Drying Chambers, making Minho one of the biggest Kiln Drying operators in Malaysia.

7.2.2 Manufacturing, exporting and dealing in moulded timber and its related products

Victory Enterprise Sdn Bhd's (VESB) major activities include manufacturing, exporting and dealing with moulded and related timber products. VESB was incorporated on 21 February 1980 and commenced operations in 1983. On 20 February 1993, VESB became a wholly-owned subsidiary of Minho (M) Berhad. VESB operates from a 15-acre site in Klang which is only about 16 kilometers from Port Klang, the largest and busiest port in Malaysia. VESB's principal activities are the manufacturing and exporting of moulding products and graded sawn timber. With a total production capacity of 10 million linear feet per month, VESB is one of the major mouldings exporters in Peninsular Malaysia.

VESB's products comprise various profiles of mouldings for woodworks catering mainly for the overseas market. Apart from general mouldings, VESB products include furniture parts, container flooring, door and window components with activities diversified into specific mouldings, finger-jointing, lamination and priming.

VESB owns a finger-jointing machine which is capable of joining-up a length of 50 feet for structural use. In line with the increasing competitiveness and the changing needs of buyers, VESB is one of the first timber moulding plants in Malaysia to invest in automation. The upgrading and modernization of the plant and machinery first took place in the early 1990s with investments totaling RM7 million. The investment has resulted not only in technologically superior products but also in cheaper production costs attributed mainly to low downtime, less wastage and scraps.

Over the years, VESB has established a strong business relationship with its traditional overseas importers mainly from Australia, Europe and United States of America. Keeping abreast with the ever changing needs of the market, the company has embarked on an aggressive marketing plan and strategy in order to tailor its products to meet the requirements of local and overseas buyers.

7.2.3 Export of processed timber products

In order to complement the core business activities of Kiln Drying, Chemical Preservative Treatment and Timber Moulding, Minho acquired a 51% interest in Costraco in 1991. Costraco acquired the entire interest of Indah Wood Product Sdn Bhd. Costraco is principally engaged in the marketing of processed timber products such as Kiln Dried Sawn Timbers and Timber Mouldings for the high-end market

particularly in Europe. Indah Wood Products Sdn Bhd concentrates on markets such as the Middle-Eastern Countries and South Africa. Costraco has consistently been ranked as one of the top ten exporters in Peninsular Malaysia in terms of Freight On Board (FOB) export value and volume by the Malaysia Timber Industry Board (MTIB). In fact, based on the full year 2001 statistics from the MTIB monthly bulletin, MASKAYU, Costraco has positioned itself as the number one timber exporter in terms of FOB.

The Costraco management team operates from an office centrally located in Petaling Jaya, Selangor. Under the leadership of a Managing Director who has more than 20 years experience in the timber business, Costraco has managed to position itself well in Europe with the brand name "COSTRACO". It has since built up a loyal customer base from all over Europe particularly in Holland, Belgium and Germany. Costraco also has a branch in Sabah for securing the huge timber supplies readily available there.

7.2.4 Manufacturing and distribution of industrial paper bags

Besides the core business activities of timber and timber related products, Minho has also diversified into making multi-wall sack kraft paper bags through it's wholly owned subsdiary, Indah Paper Industries Sdn Bhd. Indah Paper is equipped with modern high-tech machinery to produce a variety of sack kraft paper bags used for packaging

products manufactured by the Cement, Chemical, Oleochemical, Food, Coconut, Cocoa and Plaster Industries. From a total turnover of RM4.6 million in 1990, Indah Paper has managed to increase sales to RM17.1 million in 1999. However, due to a fire mishap on 12 May 2000, turnover for this division has dropped over the last 2 years. In line with the increasing competitiveness and the changing needs of buyers, Indah Paper has enhanced its operation line by installing new additional lines of Tubers, Bottomers, a state of the art 4-colour printer and other advanced paper sack related manufacturing machines from Japan.

Over the years, Indah Paper has established strong business relationships with local buyers (especially in the Klang Valley). In order to diversify its customer base, the company has embarked on an aggressive marketing strategy not only to enhance the quality of its products by using higher-grade sack kraft paper but equally importantly to tap into new potential markets both domestic and overseas.

7.2.5 Exploitation of timber concessions, trading in log supply and its related products

Lionvest Corporation (Pahang) Sdn Bhd (LCSB) is located within the Jengka Industrial Estate in Jengka in the Mukim of Cenur, District of Maran in the Central of Pahang Darul Makmur. In October 1994, Minho entered into an agreement to acquire 100% equity of LCSB for a purchase consideration of RM190 million. LCSB is principally

engaged in the logging of about 45,000 acres of virgin forest in central Pahang, Peninsular Malaysia as well as the operation of an integrated Timber Complex which includes Plymill, Sawmill, Kiln Drying, Chemical Treatment and Timber Moulding activities. The acquisition of LCSB by Minho brings synergy to the existing core business. The avaibility of timber suppliers from their resources will enhance the downstream wood processing activities of the Group.

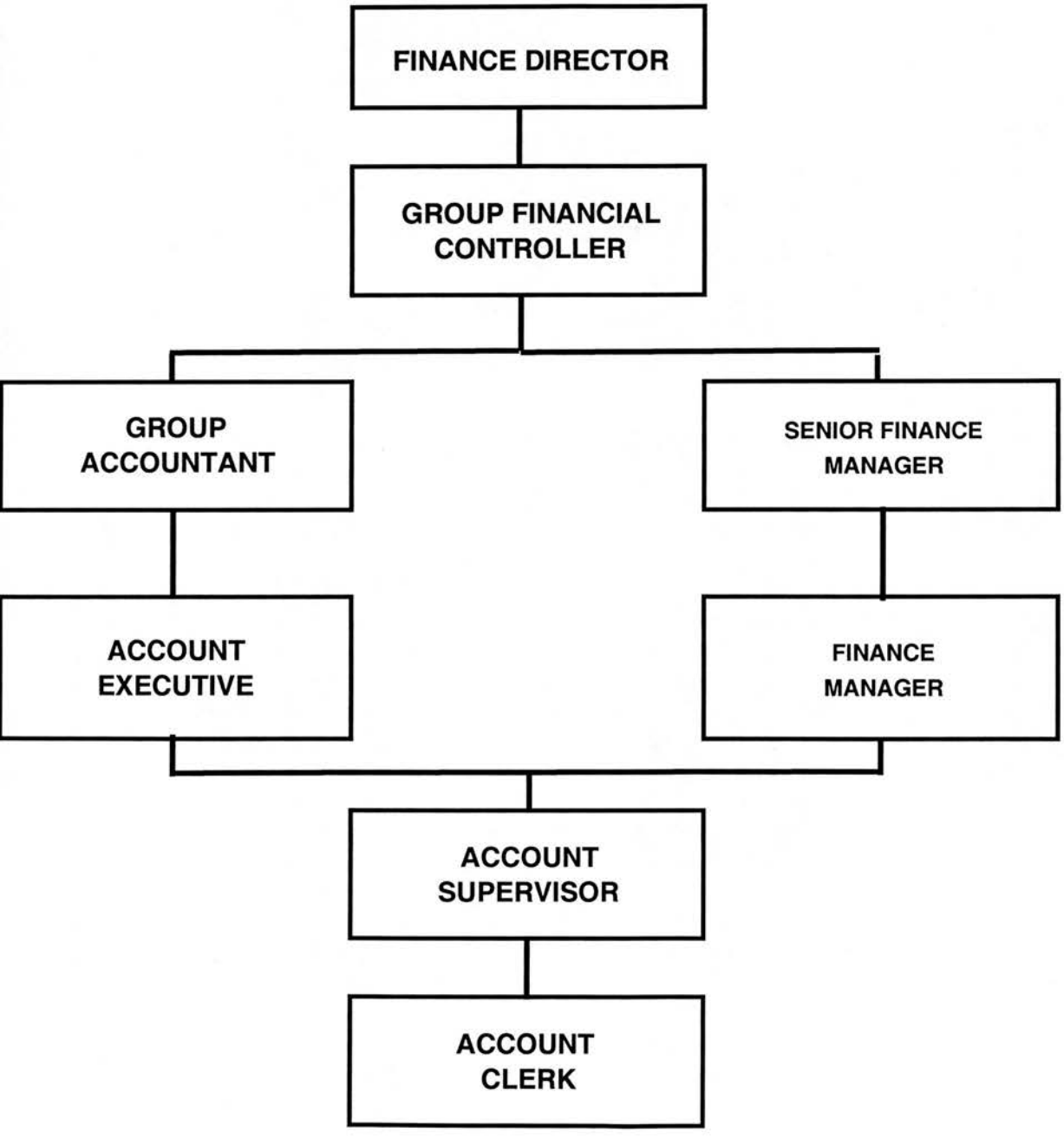
During the past 10 years, the company has seen tremendous increase in the production capacity of all sectors of timber manufacturing comprising Plywood, MDF (Medium Density Fibreboard), Sawntimber, Chipboard, Parquet (3 Ply), Moulded Timber and Furniture. Minho's Chairman has mooted the idea of having its own overseas trading arms. A proper feasibility study of the project was conducted. Having decided on the location and the right mix of people to manage this overseas operation, Lionvest Trading was set up in the UK in Hove, East Sussex. The company is headed up by a Managing Director who has more than 10 years experience in the timber business. The overseas trading arm will enable Minho to expand its British sales of the types of products referred to above and include other related timber products.

7.3 MANAGEMENT ACCOUNTING FUNCTION

The Group's Finance and Accounts Department controls all the sixteen Minho subsidiaries. The department handles all the group's financial, costing and management accounting functions. Figure 6 shows Minho's Finance and Accounts department structure.

FIGURE 6

STRUCTURE
MINHO'S FINANCE AND ACCOUNTS DEPT



There is however no cost accountant in this department. Each subsidiary has its own Finance and Accounts department which handles all the financial, management accounting and costing matters. In bigger subsidiaries a Finance Manager who is the head of the Finance department is responsible for preparing all the related reports. While in smaller subsidiaries (Lionvest Timber Industries, Lionvest Marketing, Woodvation Sdn Bhd, PPP Service Sdn Bhd) the financial and management accounting data are however compiled by a Finance Supervisor before they are submitted to the Group's Finance and Accounts department. In these subsidiaries, a supervisor heads the Finance department. All data submitted is analysed before the Group Finance and Accounts department prepares reports for these smaller subsidiaries.

A list of replicated L&W's five management accounting and control systems (MACS) and their 23 sub-systems used in the survey was shown to Mr Faizal, the Finance Manager. All the five main MACS but with less than half of the sub-systems shown seem to exist in Minho and this is confirmed by the other Finance staff. Table 73 below shows the main systems and sub-systems that exist in Minho.

Table 73

Minho Management Accounting and Control Systems (MACS)

MACS	Sub-systems
Planning Systems	• Strategic Planning • Budgeting • Operations Planning (Production)
Controlling Systems	• Transfer Pricing • Damaged Claims • Cash Flows
Costing Systems	• Direct allocation of manufacturing overhead
Directing Systems	• Reward systems – bonuses
Decision-making	• Financial and non-financial measures reported

7.3.1 Planning systems

Strategic planning

Minho's planning sub-systems consist of: budgeting, production and strategic planning. There has been growth in these planning sub-systems in recent years especially in the strategic planning system. Strategic planning, in Minho, which is concerned with long-term rather than short-term plans was implemented in 1999. Each 'active' subsidiary is therefore required to prepare and submit at the end of each year its three-year plans for cash flow, the steps to be taken to achieve these cash flows and a yearly SWOT analysis. Elements of 'strengths', 'weaknesses', 'opportunities' and 'threats' are included in each subsidiary SWOT analysis.

Budgeting systems

In addition to these new requirements, Minho's subsidiaries have been required to submit several other budgeting reports to the Group's Finance and Accounts department. Each subsidiary is required to submit its budgeted statements, management accounts and management accounting reports, yearly, monthly and quarterly, respectively. For one year ahead budgeted income, balance sheet and cash flow statements are reported in the budgeted statements. The internal monthly accounts reports consist of the profit and loss, balance sheet and cash flow statements, while the quarterly management accounting report comprises four sections: profit and loss; assets and liabilities statements; financial ratios analyses and performance review. The yearly and monthly management accounts are prepared by all subsidiaries ('active' and dormant) but only 'active' subsidiaries are required to prepare the quarterly management accounting reports. The four elements of the SWOT analysis are updated quarterly and reflected in the quarterly management accounting reports.

Operations planning (production)

The nature of Minho's business has exposed it to several seasonal problems. These problems include the rainy season which occurs during most of the last quarter of the year and the festive season which falls in the months of January and February. Production planning is therefore required by subsidiaries that are involved in log

production activities. The production planning is mostly concentrated on the last two 'profitable' quarters. Seasonal variation in annual production is therefore scheduled in the months of July to December and January to March, respectively.

7.3.2 Controlling systems

Minho Group's Finance and Accounts department controls all the subsidiaries by requiring them to submit their budgeted statements yearly, management accounts monthly and management accounting reports quarterly. All the subsidiaries are evaluated and controlled using several measures adopted by the Finance department. Their actual current financial year's results are compared against the preceding year and explanations are therefore required for any differences. Financial and non-financial measures are provided by the subsidiaries to support the differences. The budgeted amount is also compared against the actual figures and detailed variances are therefore calculated. These include variances on each activity's turnover, (e.g. Forestry, Kiln Drying, Timber Mouldings, Sawmill, Plymill), cost of sales, gross profit or loss, other income, expenses, net profit before and after tax. Detailed variances are also calculated on each type of assets (fixed and current), liabilities (short and term) and other capital employed items. In addition to these reports the Group's Finance and Accounts department applies the transfer pricing system, appraises the damaged claims value and conducts analysis on cash flows to control its subsidiaries.

Transfer pricing system

The Group's Finance and Accounts department uses transfer pricing to control the timber transfer between 'up' and 'down' stream subsidiaries. The subsidiary that was granted timber concessions by the government and logging timber in its activity is considered as the 'up stream' subsidiary, while those the timber is transferred to are the 'down stream' subsidiaries. Therefore, subsidiaries that are involved in sawn timber, moulding, manufacturing of industrial paper bags and marketing activities are considered as 'down stream' subsidiaries. Lionvest Corporation Sdn Bhd (LCSB) and Victory Enterprise Sdn Bhd are examples of the 'up stream' and 'down stream' subsidiaries, respectively.

Transfer pricing is adopted by Minho to create goal congruence among its subsidiaries. The transfer pricing is set by the Group's Finance and Accounts department and the minimum price is based on the variable costs incurred. Minho's annual capital allowances are fully utilized by allocating and adding them to the variable costs. Hence a combination of these two amounts is the transfer price for the subsidiaries concerned.

This transfer pricing policy is however only applied between subsidiaries that are involved in logging activities and 'down stream' subsidiaries which are involved in the sawn timber activities. It is not applied to other transfers among other subsidiaries. According to Mr Faizal the Finance Manager, logs are considered as an 'active product'

and are therefore highly demanded by the outside market. The Group's Finance and Accounts department decide on the transfer percentages between the 'up stream' to the other 'down stream' subsidiaries and the external markets. The percentages set are based on the level of log consumptions reported in the budgeted statements prepared by the subsidiaries. For example if the demand for timber is forecast to be high for that particular year, 70% and 30% of the log areas are reserved for other subsidiaries and the outside market, respectively. If the market is however expected to be sluggish, an equal percentage (50%) is set on both (subsidiaries and external market). This means that the 'up stream' subsidiary can sell 30% and 50% of its extracted logs direct to the external market during the 'high' and 'low' period, respectively. According to Mr Faizal the Finance Manager, 50% of log consumption was set as the minimum rate as it is the least each subsidiary needs for its operations. The 'up stream' managers are controlled even though they are given the rights to sell the extracted logs to the external market. They are evaluated based on their yearly, quarterly and monthly reports submitted to the Group's Accounts department. Their abilities to sell the logs externally at the highest price will reflect their performance. This is an instrument for the company to motivate and control the managers to find 'good' buyers in the external market.

Damaged claims

The Group's Finance and Accounts department also uses the damaged claims (value in Ringgit Malaysia) reported in the management accounting reports as a controlling

device on its subsidiaries. Damaged claims are complaints from customers on the quality of the products and the handling process. These normally include claims on cracked timber, 'hole' in the timber and timber moisture content. A further investigation is conducted on claims that are more that 10% of the annual turnover. This is because the Group's Finance and Accounts department considers claims that are 10% of the turnover or lesser as the market norm. These claims are normally supported with appropriate explanations and non-financial measures.

Cash flows

All daily cash flow and expenses are controlled by the subsidiaries themselves. The subsidiaries however do not have control on any capital investments decisions. The Group's Finance and Accounts Department has the authority on all its subsidiaries' capital investment decisions. The cash flow and expenses are monitored through analyzing the figures reported in the management accounting reports submitted by the subsidiaries.

7.3.3 Costing systems

Minho's costing systems only apply to its manufacturing subsidiaries. There are three manufacturing subsidiaries and they are: Lionvest Corporation Sdn Bhd (LCSB); Indah

Paper Industries Sdn Bhd (IPSB) and Victory Enterprise Sdn Bhd (VESB). Plywood, moulding and paper bags are the main activities for LCSB, IPSB and VESB, respectively. Production volume is used to allocate the manufacturing costs to the three subsidiaries. Cubic meters, linear feet and pieces are the production volume used to allocate these manufacturing costs to LCSB, IPSB and VESB, respectively.

7.3.4 Directing systems

The directing sub-system that exists in Minho is its reward system. The reward system is specifically referred to as the bonus payments. Long run rather than short-run performance is adopted by Minho in its reward system. According to Mr Faizal the Finance Manager, this is to avoid paying the staff a high amount of bonus in 'good' situations and nothing in 'bad' situations. Based on this policy, all staff are rewarded with a bonus on a pro-rate basis. Regardless of the market situation, the staff is paid an average two months bonus. The management believes the employees motivation and commitment can be sustained by adopting this policy. Staff yearly increments however depend on their performances and not the yearly bonus.

7.3.5 Decision-making systems

Focus on globalization has forced most Malaysian companies to constantly search for potential growth and development in the global marketplace. Globalization, in fact, is included as an essential element in most of Minho subsidiaries' SWOT analysis. Any decision to invest in an overseas market involves several decision-making procedures. The decision needs to be supported by a feasibility study. A feasibility study will be carried-out by the subsidiary which is interested in investing in any of the potential overseas markets. During this feasibility study a selected team will gather all information on this market. Financial information includes information on product price, cost, gross margin and net margin. These financial measures are supported by non-financial information which includes information on investment risk, hidden costs, tax policies, regulations on transfer of cash, exchange rate fluctuation and availability of local labour. In addition the pay-back period technique is used to evaluate Minho's capital investment decisions. According to Mr Faizal the Finance Manager, this method is adopted because of the simplicity in its calculations and it is easily understood by the managers.

Consequently a decision-making report is prepared and presented direct to the Board of Directors (BOD). Due to time constraints, the BOD is presented with summarized proposals and on several occasions this has resulted in less than accurate decisions. More time is needed by the BOD to analyse what has caused delay to several of its

important projects. To overcome these problems, a committee was formed. This committee was called the Risk Management Committee (RMC). Reports on all potential investments are submitted and presented to the RMC. After analyzing all the factors (financial, non-financial and pay-back period), the feasibility of the projects is decided by the RMC. Only those feasible potential investments are submitted and presented to the BOD before they are approved.

7.4 CHANGES IN MINHO BHD.'S MANAGEMENT ACCOUNTING SYSTEMS

The survey research in this study has categorized management accounting change into five various dimensions as follows:

1. Introduction of new techniques as replacements for existing ones
2. Introduction of new techniques where no management accounting previously existed
3. Modification in the management accounting information or outputs
4. Modification of a technical nature of a management accounting technique or system
5. Removal of a management accounting technique or system with no replacement

Two out of these five management accounting change dimensions were discovered in the case study company (Minho Bhd). These two dimensions include the most commonly found type of change (modification in the information or output) in the survey and a type which was relatively rare (introduction of new techniques where no management accounting previously existed). They are explained in the following paragraphs.

7.4.1 Introduction of new techniques where no management accounting previously existed

This dimension involves the extension of the management accounting system by the introduction of new (to the organisation) techniques. It therefore necessarily relates to the initial development of new management accounting. This involves the emergence of strategic financial planning for Minho for the first time.

7.4.2 Strategic planning

There is strong theoretical support for the idea that MACS can serve an active role in shaping organizational change. However few studies have examined how the role of accounting might change depending on the strategy set by an organisation. The

questions of how orgnanisations use MACS to facilitate and support the strategic change process, how change occurs, who initiates it, what constraints it and the mechanisms used to facilitate it, are largely unexplained (Abernethy and Brownell, 1999, p. 189 – 190).

Shortell *et al* (1990) defined strategic change as the extent to which a firm is moving along the defender and prospector continuum[16]. There were no formal strategic planning systems operating in Minho Bhd before the 1997 Thai devaluation crises. According to Mr Loo Say Leng, the Director,

> There was no strategic planning in Minho before the crisis. Immediate actions were taken as the event occurred. Since the economic crisis I think the company has been looking at a longer-term planning. The plan is much more realistic than before. The planning covers not just for next year but medium term planning, 3 to 5 years. The company even started to include plan for more than 5 years.

In accordance with the implementation of the strategic planning system by Minho, the 'active' subsidiaries were also required to prepare three year strategic planning. It was in mid 1999 that each active subsidiary was required to prepare three-year plans for cash flow, specify the steps taken to achieve these cash flows and provide a yearly SWOT analysis as a context for these financial projections. For example in mid 1999, three-year cash flow plans were prepared for the second half of 1999, 2000 and 2001.

[16] Miles and Snow (1978) characteristics a firm's product market stance as a continuum with 'defender' (a strategic stance focusing on maintaining market leadership in a limited and relatively stable range of products and services) and one end 'prospectors' (firms whose strategy involves frequent changes and quick responses to new market opportunities) at the other.

This was the first stage in the strategic planning process. Management commentaries on the three-year plans were also prepared and discussed during a meeting. Top management requires information that is more prospective in nature and this encourages increased interaction with subordinates. Interactive use of budgeting provides a vehicle for the top management to reveal their values and preferences to organisation members. It enables the interchange of information concerning the opportunities, threats, strengths and weaknesses (Laitinen, 2003). Projections provide a means of debating how to respond to environmental changes and also play a pro-active role in facilitating the effective implementation of strategic planning. Strategic change is a complex construct which incorporates multiple dimensions and is thus particularly difficult to operationalize. There are no studies in the accounting literature which have attempted to measure strategic change (Abernethy and Brownell, 1999, p. 192 –194)

The first internal meeting between the Chief Executive Officers (CEOs), Senior Managers of the active subsidiaries and the Finance Director was held to discuss these projections and other issues before they were finalized. It was during Minho's mid 1999 Annual General Meeting (AGM) that the first finalized projections, along with other issues, were presented. A similar process was conducted annually to enable new circumstances to be incorporated. For example, the impact of the September 11, 2001 disaster was incorporated in preparing the subsidiaries' three year (2002, 2003, 2004) rolling projections. It was, however, during May 2002 that a special management meeting was held to specifically discuss how the new strategic planning system was

functioning. Minho's strategic planning was further 'improved' and 'directed' with the minimum outline which was amended and released by the Malaysian Code on Corporate Governance in September 2002. The outline is divided into ten main parts and several sub-sections:

Outline of a Strategic Plan

1.	**Executive Summary** Brief profile of the Company and Group Vision and Mission Statements Purpose of the plan
2.	**Market Analysis** Industry Description and Outlook Target Markets Market Test Results Lead Times Competition Regulatory Restrictions
3.	**Company/Group Description** Nature of Business Distinctive Competencies
4.	**Marketing and Sales Activities** Overall Marketing Strategy Sales Strategies
5.	**Products and Services** Detailed Product/Service Description Product Life Cycle Copyrights, Patents and Trade Secrets Research and Development Activities
6.	**Operations** Production and Service Delivery Procedure Production and Service Delivery Capability Operating Competitive Advantage Suppliers
7.	**Management and Ownership** Management Staff Structure Key Managers Planned Additions to the Current management Team Legal Structure of the Business Owners Board of Directors

8.	**Funds required and their uses** Current Funding Requirements Funding Requirements over the Next 5 years Use of Funds Long Term Financial Strategy
9.	**Financial Data** Historical Financial Data Prospective Financial Data Analysis
10.	**Appendices or Exhibits** Resume of Key Managers Pictures of Products Significant Contracts Market Studies Published Information (Magazine/Newspaper Articles, References to books)

During the special strategic planning meeting the three years 'rolling' cash flow, policies to be followed, management comments and the yearly SWOT analysis were updated and tabled for the BOD approval at the end of the year 2002. SWOT analysis reviewed each 'active' subsidiary strengths, weaknesses, opportunities and threats during a particular year. Several aspects were included in explaining each of the SWOT elements and they created more demands on management accounting and therefore promoted change as summarized below:

Strengths

As part of the strategic planning, each division has focused on several strengths which are normally based on factors internal to the division. Identifying existing and new strengths within the division help to balance the impact of any unexpected circumstances such as the 1997 crisis. Most of a subsidiary's strength arises from its products, internal processes and market diversification.

The subsidiaries' strength is to have well diversified principal activities or divisions which include a combination of the following activities:

1. Kiln drying and chemical preservative treatment;
2. Manufacturing, exporting and dealing in moulded timber and its related products;
3. Export of processed timber products;
4. Manufacturing and distribution of industrial paper bags;
5. Trading in log supply and its related products;
6. Exploitation of timber concessions; and
7. The operation of a fully integrated timber complex

Well-diversified activities not only help minimize the overall division and subsidiary losses but also to ease the decision-making process. For example Lionvest Corporation

(Pahang) Sdn Bhd (LCSB), one of Minho's subsidiaries acquired a company that produced plywood, in 1995. This company contributed to most of the losses (RM22,644,000) in 1996 and continued making losses in 1997. Since 1996 this company (which produced plywood) has been subsidized by the logging activity. Performance evaluations conducted to support the decision on whether to continue or close LCSB. Eventually the decision to close the plywood division was made in the year 2000. Diversified activities not only ease the decision-making process but also demand several other management accounting techniques. Major management accounting reporting changes were reported and included in the performance of each subsidiary's divisions. These included divisional turnover, selling price, profit, production analyses and other non-financial measures.

Minho also realized the danger of concentrating only on the 'local or traditional market'. The local market covers Malaysia and other Asian countries. Most subsidiaries' strategies are to focus, diversify and increase their international market through globalization. This 'position outside Malaysia' strategy covers the concept of getting to 'know the customer direct' and not through their agents. Detailed information is therefore required before a decision to invest in any of the overseas markets is made. For example in 1998, a selected research team was formed before Minho decided to invest in an overseas company, Lionvest Trading (UK) Ltd in Hove, East Sussex, UK. Research conducted on the UK market showed that the use of carpets was not healthy. Based on this research, Minho expected a huge potential demand for flooring in the UK

market. This further encouraged Minho to invest in Lionvest Trading (UK) Ltd. In addition, the investing decision demanded several types of management accounting information which included: reports on competitors' product pricing and quality; direct cost analyses and reviews of other related costs such as administrative, selling and marketing.

In addition to products, activities and market diversification several subsidiaries also included other strengths in their strategy analysis. For instance, LCSB has been granted by the Pahang State Government, via its Forestry Department, to undertake a timber reforestation project covering an area of 50,000 hectares in Central Pahang (Circular to Shareholders, 30th August 2000, p.10). This grant enables LCSB to control and plan its log extraction and production. This therefore can minimize any problems arising from excess or shortage of logs supply. Ability to control the logs extractions was stated in the 30th September 2001 and 31st March 2002 quarterly reports respectively as,

> Total logs extracted for the 3rd quarter this year was 57% lower than the corresponding period of last year due to unattractive selling price of logs...

> Total logs extracted in the quarter rose by 171% compared to the preceding year's corresponding quarter

This grant enabled LCSB to incorporate more non-financial controlling and planning measures in its management accounting report. Sales and market analyses on the subsidiaries' top 10 customers were also provided for the first time. Other new

measures included: logs sent for cross cutting; logs deduction percentage; average diameter of logs; total logs and blocks logs consumed; veneer production; plywood production; net production recovery percentage.

Weaknesses

In preparing the yearly strategic planning, each subsidiary has also focused on several weaknesses. The nature of the timber business is exposed to seasonal problems. Most of the Malaysian states normally experience the rainy season during the last quarter of the year. Another common problem for all the subsidiaries is the Malaysian festival season which falls in the months of January and February. Stated in every fourth quarterly reports as,

> The business operations of the Group are generally affected by the monsoon seasons and also the major festive seasons namely Hari Raya Puasa and Chinese New Years celebrations

> ...slowdown in the supply of logs from the logging division caused by the monsoon season...

The rainy and festival seasons patterns have indirectly demanded the subsidiaries to begin including contingency plans within their new strategic planning system. The contingency plans include importing certain timber. Management accounting analyses were conducted before deciding whether to import certain types of timber species from Indonesia, Papua New Guinea or to buy these locally. The timber costs from several

countries were obtained and compared. Importing certain timber species seemed to be cheaper as the Malaysian Government imposes a high royalty on extracting these species locally. Proper decisions on whether to import or extract this timber locally have resulted in favourable financial results as stated in the 31st December 1999 and 31st March 2002 quarterly reports respectively:

> New sales value amounted to RM27.6 million of timber supplies (sawntimber) imported from overseas
>
> The importation of foreign timbers was the major factor in the improved turnover of Timber Moulding Division

The rainy and festival seasons patterns have also indirectly caused each subsidiary to plan its operations. Minho's operation plans relate to logging activities which are concentrated towards the last two quarters (from the months of July to December). These quarters are considered as the 'profitable half'. Demand and supply seems to be active in these quarters. Slow logging and production activities are however planned in every year's first quarter (January to March).

Opportunities

The strategic planning prepared by the subsidiaries must also highlight future performance and several plans have to be created to capture external opportunities. As Minho's strategy is to diversify and increase its international market through

globalization, more subsidiary planning was focused on the 'non-traditional' market. The 'non-traditional market' can be categorized into 'high-end' and 'low-end' markets. 'High-end' and 'low-end' markets are those countries that are concerned or less concerned with timber quality, respectively. European and US companies are regarded as the 'high-end' of the market. 'Low-end' are however companies from the Middle-East and the South African countries.

In capturing any of these potential markets, financial and non-financial measures are required by Minho's management accounting system. These include financial measures such as products profitability and non-financial measures such as: market segment analysis of sales, construction growth, the potential economic market stability and hidden costs. Hidden costs are those costs that are associated with any logistic problems, foreign customs and regulations. Decisions to invest in any of the 'high-end' and 'low-end' markets depend heavily on these measures. For example an analysis was conducted before Minho decided to diversify more of its products to European rather than to US markets. In addition to the financial measures, the European markets appeared to be more stable and this is supported by the 31st December 1999, 31st March 2000 and 30th September 2000 quarterly reports respectively:

> The management expects the demand for the Group timber products such as plywood, kiln dried and sawntimber, moulded timber and furniture parts as well as timber flooring to remain strong for the remaining quarter of the year, particularly from overseas markets in Europe and the United Kingdom

> Apart from our non-timber operations, management expects the demand for the Group timber products such as plywood, kiln dried sawntimber, moulded timber and furniture parts as well as timber flooring to remain strong for the remaining 3 quarters of the year, particularly from the overseas markets in Europe and the United Kingdom
>
> The better performance was mainly due to strong demand for our timber products from the higher end market in Europe in the first half of the year 2000

Threats

A movement towards globalization has forced each division to consider issues from an international perspective. This is a process of managers becoming aware of the impact of international activities on the future of their divisions. The ability to compete and engage in a strategy of positioning in the global market place requires managers to capture current knowledge on accounting, information, computer technologies through their previous and on-going studies, attending conferences and in-house training. For example, even though Mr Faizal the Finance Manager, has an accounting degree from the UK, he is currently attending a part-time accounting degree programme, locally. According to him, this local programme will expose him to more Malaysian Accounting regulations and they are more applicable to his current job.

Employees new knowledge in the various areas has led to changes in Minho's MACS. For example, the idea to introduce strategic planning came from Minho's own

employees. According to Mr Faizal, the Finance Manager, the recommendation for strategic planning came from the Group Accountant, who produced the strategic planning format for Minho's management. However Mr Loo Say Leng, the Director, viewed the accountant's contribution as a catalyst to a more general movement within the company.

> When the crisis arose, cash flow was tied, creditors were worried about payments, debtors were dragging their accounts. Performances for all levels in the company had to be monitored. There were a lot of issues to be discussed and done. Within a short period of time, a strategic committee was formed. There was no one particular department that started the strategic planning, it came from almost all levels of the company. However, the main trigger was from the accounting side.

New technologies adopted in the kiln drying process by the competitors from the developed countries also seemed to be a threat to Minho. Minho's existing chamber process normally takes 2 to 3 months to process, compared to 1 month or less with the new technology. At the same cost, competitors from the developed countries are able to service the customer faster. This threat has created further demand for management accounting information such as the process time, incremental and maintenance costs and other capital investment information. Analyses on kiln drying process using different technologies also needed to be evaluated before adoption. This involved the establishment of a decision-making process to analyse whether to develop Minho's existing kiln drying process using second-hand new technology from Taiwan and China or to upgrade the process with new state of the alternative technology.

7.4.3 The role of the management accountant in the SWOT analysis

The main role of the management accountant in the strategic planning implementation was to educate all Minho's managers on this new system. Representatives from the Finance and Accounts department visited all the sixteen subsidiaries. The whole concept of strategic planning and the SWOT analysis was demonstrated and explained to managers. They were also informed what was required from them. Prior to the minimum outline released by the Malaysian Code on Corporate Governance, the Group Finance and Accounts department had prepared a minimum standard for all the subsidiaries. In addition to this minimum standard, subsidiaries were invited to include additional information on their strategic plan.

Each subsidiary is required to prepare its own strategic plan before it is analysed by the Group Finance Department. For control purposes the budgeted figures are checked to see whether they are realistic. This is to avoid managers setting too low figures to act as 'buffer' or 'cushion'. The managers will put in less effort if the budget is set at a level that can easily be achieved. The reported budgeted price and demand are also checked against the market figures. The Finance Department can obtain this information from the third party report, Malaysian Timber Industrial Board (MTIB). This report provides information on the average selling price and potential demand for all types of timber. If the figures produced are unrealistic, a meeting with the respective subsidiary will be

conducted. The figures will be analysed and agreed upon before they are submitted to the Board.

7.4.4 Modification in the information or output

The discussion above demonstrated that the introduction of strategic planning in Minho has caused a range of changes in the management accounting information within the company. These changes took place either by adding to or modifying the budget based information and other management accounting outputs. This revealed that Minho's change in one management accounting dimension (introducing strategic planning where no such technique previously existed) led to another management accounting change dimension (modification in the management accounting information or output). Change therefore occurred as a chain reaction.

Before Minho implemented the strategic planning system, each subsidiary was required to submit its budgeted statements, monthly management accounts and quarterly management accounting reports to the Finance Department. The budgeted statements comprised one year's budgeted income, balance sheet and cash flow statements. The monthly management accounts report consists of three sections: profit and loss, balance sheet and cash flow statements. This report seems to contain only accounting information and is prepared by all the subsidiaries ('active' and dormant). The quarterly

management accounting report however consists of four sections: profit and loss; assets and liabilities statements; financial ratios analysis and the performance review. This report contains both financial accounting and management accounting information and is prepared only by the 'active' subsidiaries.

However in line with the new strategic planning system, information or output of several of these statements and reports has changed. According to Mr Faizal, the Finance Manager, there were no changes in the monthly management accounts and three sections of the quarterly management accounting report: profit and loss; assets and liabilities statements; financial ratios analysis. There are however several modifications in the information output produced in the form of budgeted statements and the performance review section in the quarterly management accounting report. The following review will illustrate the changes.

7.4.5 Budgeting Statements

Prior to strategic planning implementation each subsidiary used to prepare and submit one year's budgeted income, balance sheet and cash flow statements. Minho used to practice an incremental budgeting approach as the basis of its budgeting system. The budgeted figures were simply calculated by adding an additional 10% to the previous year's budgeted figures. As stated by Mr Loo Say Leng, the Director,

> Prior to strategic planning implementation, only one year's budgeted figures were prepared with a 10% increase across the board.

The decision to introduce strategic planning has changed the information content of the budgeted statements. Instead of preparing only one year's budgeted statements, subsidiaries were required to prepare and submit three years' projections on income, balance sheet and cash flows. For example in the year 2001, three years' (2002, 2003, 2004) projections on these statements were prepared. These figures were however updated with new circumstances yearly. Tables 74 shows the budgeted statements which were modeled on the statutory accounts and they are as follows:

Table 74

Minho's Profit and Loss Projections

For the year ended 31 December 2002 - 2004

	2002	2003	2004
	RM'000	RM'000	RM'000
INCOME			
Dividend receivable	X	X	X
Management fees	X	X	X
Interest income from financial institution	X	X	X
Interest income from related company	X	X	X
Rental income	X	X	X
OPERATING EXPENSES			
Directors fee	X	X	X
Group expenses	X	X	X
Annual listing fee	X	X	X
Audit fee	X	X	X
Secretarial fee	X	X	X
Professional fee	X	X	X
Interest	X	X	X
Bond expenses	X	X	X
Term loan/Bond interest	X	X	X
Others	X	X	X
PROFIT BEFORE TAX			
TAXATION			
Current	X	X	X
Deferred	X	X	X
PROFIT AFTER TAX	X	X	X
RETAINED PROFIT B/F	X	X	X
RETAINED PROFIT FOR THE YEAR	X	X	X
DIVIDENDS	X	X	X
EXTRAORDINARY ITEMS	X	X	X
RETAINED PROFIT C/F	X	X	X

Minho's Balance Sheet Projections
As at 31 December 2002 – 2004

	2002	2003	2004
	RM'000	**RM'000**	**RM'000**
CURRENT ASSETS			
Other debtors	X	X	X
Tax credit	X	X	X
Fixed deposits with Licensed banks	X	X	X
Cash and bank balances	X	X	X
Amount due from subsidiary companies	X	X	X
Dividend receivable	X	X	X
	XX	XX	XX
CURRENT LIABILITIES			
Other creditors	X	X	X
Bank overdraft	X	X	X
Amount due to subsidiary companies	X	X	X
Proposed dividends	X	X	X
Taxation	X	X	X
Bank loan – short term	X	X	X
	XX	XX	XX
NET CURRENT ASSETS/(LIABILITIES)	XXX	XXX	XXX
FIXED ASSETS	X	X	X
OTHER INVESTMENTS	X	X	X
INVESTMENT IN SUBSIDIARIES	X	X	X
DEFERRED EXPENDITURE	X	X	X
	XXX	XXX	XXX
Represented by:			
SHARE CAPITAL	X	X	X
RETAINED EARNINGS	X	X	X
SHARE PREMIUM	X	X	X
BOND	X	X	X
BANK LOAN – LONG TERM	X	X	X
DEFERRED TAX	X	X	X
	XXX	XXX	XXX

Minho's Cash Flow Projections

For the year ended 31 December 2002 – 2004

	2002	2003	2004
	RM'000	**RM'000**	**RM'000**
CASH FLOW FROM OPERATING ACTIVITIES			
Cash receipts from:			
Dividend income	X	X	X
Management fee	X	X	X
Interest income from financial institution	X	X	X
Interest income from related company	X	X	X
Rental income	X	X	X
	XX	XX	XX
Payments for operating expenses	X	X	X
Payment for tax	X	X	X
Payment for dividends	X	X	X
Payment for Bonds expenses	X	X	X
Payment for right issue expenses	X	X	X
Payment of Term loan/Bond interest	X	X	X
	XX	XX	XX
Net cash used in operating activities	XXX	XXX	XXX
CASH FLOW FROM INVESTMENT/FINANCING ACTIVITIES			
Repayment of loans/bonds	X	X	X
Advances to subsidiary company	X	X	X
Repayment of advances from subsidiary company	X	X	XX
Purchase of fixed assets	X	X	X
Advances from subsidiary companies	X	X	X
Transfer to time deposits	X	X	X
Exercise of warrants	X	X	X
Proceed from Right issue	X	X	X
Proceed from Private Placement	X	X	X
Exercise of ESOS	X	X	X
Drawdown from Bond	X	X	
NET INCREASE/(DECREASE) IN CASH DURING THE YEAR CASH, JANUARY 1 2002 – 2004	XXX	XXX	XXX
CASH, DECEMBER 31 2002 -2002	XXX	XXX	XXX

7.4.6 Management Accounting Reports

There were several changes in the performance review section of the quarterly management accounting reports. LCSB's (a subsidiary of Minho) 1997 and 2000 management accounting reports are used to analyse these changes. These two years reports were selected for comparison as the strategic planning system was initially introduced by Minho in mid 1999. The year 2000's management accounting report has incorporated the changes. Any changes by the way of modifying the performance review information or output is the result of the new implemented strategic planning system.

The performance review section consists of two parts: the performance of the subsidiary and the performance of each division. There were no changes shown in the subsidiary's performance review. Major changes on the performance information were however shown by LCSB's division performance review section. There are three divisions in LCSB:

- Forestry;
- Plywill;
- Sawmill.

In the 1997 divisional performance review section, each division's current operating profit was compared against the previous financial year. Reasons for the difference were given and normally explained by the logging activities, volume of timber logs extracted and prices. The year 2000's divisional performance review section however included some modification to this information. New comparisons were provided in this divisional performance review section:

1. Turnover;
2. Average selling price;
3. Operating profit;
4. Production;

The changes in the information are summarized below.

Turnover

Comparison between the current and previous year's turnover was provided by each of LCSB's divisions. In addition to the sales volume, price and volume of logs extracted, explanation on the competitors' price, freight costs and the demand pattern were also included.

Average selling price

The Forestry division provided comparison between the average selling prices for each block logged for the previous and current year, while the Plymill division provided comparison between the average selling price for Export and Local Grade plywood for both years. An explanation has to be provided if the current year's average selling price is lower than the previous year's.

Operating profit

The operating profit for the current year was compared against the corresponding period. Reasons and explanation were given for the lower current year's profit. This included analysis of the turnover, profit margin, production cost per unit, cost of sales per unit, production and closing stock written down.

Production

The production of logs at the end of the current year was compared with the corresponding period. Reasons were given for any decline in production. The Forestry division also provided comparison of the total acreage, tonnage and average yield in ton. A thorough comparison for these two years was provided by the Plymill division and this included analysis on the following:

- Logs sent for cross cutting
- Logs deduction percentage
- Average diameter of logs
- Total logs and blocks logs consumed
- Veneer production
- Plywood production
- Net production recovery percentage

In addition to the above analysis, additional information was also provided on each of the following: logging activity, problems, process, log quality and new Government logging rulings.

Debtors

Turnover, total debtors and debtors ratios as at the end of the current year were compared against the corresponding period. Reasons were provided for any increase in these amounts. Major debtors with outstanding balances for more than 90 days, 60 to 90 days, 30 to 60 days and for the current month were provided by each division. Their reasons for having difficulties in their payment were also stated.

7.5 FACTORS THAT CAUSED CHANGES

The previous section illustrated two management accounting change dimensions discovered in the case study company, Minho. The first management accounting change dimension was the strategic planning implementation. As a result of this new system, other management accounting systems such as the budgeting statements and management accounting reports were also affected. More financial and non-financial measures were added to this information.

The different dimensions show that management accounting change is not a homogenous phenomenon. Accordingly the causal factors of change may also be expected to vary. The next section identifies causal factors (external and internal) that have led to these management accounting change dimensions in the case study company, Minho.

7.5.1 External factors

The external factors that caused Minho's management accounting systems to change can be grouped into 'newly' discovered factors and factors derived from the literature review and used in the previous survey (others).

7.5.2 'Newly' discovered external factors

Thai devaluation crisis

As suggested by Abernethy and Brownell (1999, p. 200),

> One particularly fruitful area for further study would be to assess the factors which influence strategic change and how this in turn influences control system design.

The Thai currency devaluation which emerged in early July 1997 contributed to a deep and enduring economic recession in Asian countries which includes Malaysia. Most Malaysian companies, including timber-related companies, were operating in adverse environmental circumstances. It was the sustained effects of this Thai crisis that put pressure on Minho to implement its new strategic planning system. A similar scenario can be seen from the Anderson and Lanen (1999) study which presents a broad overview of changes in management accounting practices in most Indian organisations during the economic reform that took place in 1991. The study showed that the planning and control process has become more decentralized, strategic objectives are more widely understood, and critical information inputs for strategy formulation have changed with the reforms.

The economic slow-down due to the Thai devaluation crisis also affected Minho's planning systems. According to Mr Faizal the Finance Manager,

> ... it was after the 1997 crisis that we realized the need for a long term planning, for at least a three-year planning

Mr Loo Say Leng the Director further added,

> The company has no long term planning, because what ever we produced can be easily sold. But now with the crisis the company has to plan on how much to produce. The unsold products may have a chain effect throughout the company.

One of the advantages of having long term planning is to reduce the risk of having large amount of unsold products which could cause a chain effect in Minho's overall activities. Liquidity problems can arise if large amount of money is tied up in the unsold products. A slow stock turnover will result in the organization borrowing more money to fund its working capital and then having difficulty in paying its debts on time.

During the 'unstable' environment caused by this economic slowdown, Minho realized that several important issues had been neglected and these had to be addressed. The considerations included diversification strategies relating to suppliers, markets and products. The 1997 crisis has exposed Minho to a higher business risk and complexity in its business activities. Strategic planning implementation is an attempt to ensure that its strategy is comprehensive and takes into account the environment within which Minho operates.

11th September 2001 crisis

Strategic planning implemented by Minho required the subsidiaries to prepare a number of additional reports which included the three years profit and loss projections, balance sheet forecasts, cash flow projections, steps taken to achieve the cash flow projections, management comments and the yearly SWOT analysis. These reports are updated yearly. The 11th September 2001 disaster has caused amendments to Minho's 'rolling' planning. There were major changes to the year 2002, 2003 and 2004 profit and loss projections, balance sheet forecasts, cash flow projections, steps taken to achieve the cash flow projections and management comments. They were updated with regard to these new circumstances and tabled to the Board of Directors for approval at the end of the year 2001.

Adjustments to projected and forecasted information were needed as management foresaw the slide toward recession due to this crisis. This was proven by the lower turnover in 2001 as a result of the sluggish overseas and local demand for timber. The impact of this slowdown is stated in the 30th September 2001 quarterly report as,

> The Group recorded a total turnover of RM178 million. A of 30th September 2001, the turnover was 27% lower compared to the corresponding period last year. All divisions in the group experienced a drop in their turnover ranging from 13% to 68% except for Lionvest trading (UK) Ltd which showed a slight increase of 4%. Jengka Timber Complex's total turnover was slashed by RM19 million compared to the corresponding period last year... Costraco's total turnover for the nine months period of this year has declined significantly by RM39 million

> compared to the same period last year due to weak demand locally and overseas for the timber products

An immediate strategy was directed at the logging division by reducing logging and production activities to less than half of the capacity. As stated in the amended 30th September 2001 quarterly report,

> Total logs extracted for the 3rd quarter this year was 57% lower than the corresponding period of last year due to the unattractive selling price of log...

These strategies were taken to reduce the cost for storage and excess timber supply.

Globalization and Corporate Governance

The economic crisis of 1997 the fallout from 11th September 2001 also caused the Kuala Lumpur Stock Exchange (KLSE) to improve its corporate governance requirements. New requirements were needed as poor governance practices and the abuse of power in some companies had caused company shares to plunge and the whole stock market to tumble, particularly in late 1997. Since then, the call to implement higher standards of corporate governance and 'going global' have been greater than ever before. Globalization has already been identified as reasons for management accounting to change (Emsley, 2001) through the need which it creates for strategic planning (Nanni *et al*, 1992). As globalization spreads its wings, there will be added pressure on

countries like Malaysia to show good governance standards. Good corporate governance has been a buzzword since the onset of the financial crises in July 1997. The heightened levels of corporate governance are one of the Malaysian economic recovery efforts which will enable companies to tap into a larger sphere of foreign funds. A key finding in the survey of corporate governance, conducted by the Kuala Lumpur Stock Exchange (KLSE) and PricewaterhouseCooper, indicated that corporate governance could enhance investor confidence.[17]

Over the course of 1998, the Malaysian government, through its various regulatory agencies, has initiated further improvements to the corporate governance framework. For example on the 11th March 1999, the KLSE announced requirements on quarterly reporting financial statements for all public listed companies (PLCs). The components of these reports include: the balance sheet; income statements and explanatory notes. On September 2002, the KLSE announced further additional requirements on the explanatory notes. All PLCs are required to submit more detailed explanatory notes.

The changes in these financial accounting regulatory requirements seem to have impacts on Minho's management accounting reports. As cited by Haldma and Laats (2002, p. 380),

> Conceptual changes in the legal (financial) accounting level of a company would therefore serve as a precondition for the design and

[17] http://www.klse.com.my/website/news/pr/1999/990326.htm

introduction of its management accounting area, and consequently the development of the MAS

For example, KLSE announcements of 11th March 1999 have required Minho to submit its first quarterly report. Consolidated results representing the financial period which ends on 30th September 1999 was the first Minho quarterly report submitted to the KLSE. The report included financial results such as the balance sheet, income statements and explanatory notes. More detailed notes and analysis of subsidiaries' results were demanded by additional requirements towards the end of year 2002. As a result of these new requirements, Minho's management team held a meeting and made the decision to increase the management accounting reporting frequency. Commencing from the year 2003 all Minho's 'active' subsidiaries are required to change the frequency of their management accounting reports submission. Instead of submitting a management accounting report once in three months, they were requested to submit the report monthly. According to Mr Faizal the Finance Manager, the new monthly management accounting reports will be more informative with detailed notes on each subsidiary's analysis results. Changes in the submission frequencies apply to all Minho's sixteen subsidiaries. Thus a change in financial accounting has led to a consequent change in management accounting.

Minho's new strategic planning system involves a continuous process and each stage of the process is influenced by different causal factor or factors: the Thai devaluation crisis; 11th September 2001; the government policies on globalization and corporate

governance. Different stages of the strategic planning change process however affect the other management accounting systems. Budgeting statements and management accounting reports information were modified according to this change process. The changes in Minho's strategic planning, budgeting statements and management accounting reports are summarized by the following diagram which illustrates the dynamics of how change occurred over time.

FIGURE 7

STAGES IN MINHO'S MACS CHANGE PROCESS

	1997 CRISIS → MAC 1999 KLSE NEW LISTING REQUIREMENT	JAN 2001 DISCLOSURE ON CORPORATE GOVERNANCE → 11TH SEPTEMBER 2001	SEPTEMBER 2002 M'SIA CODE ON CORPORATE GOVERNANCE
PLANNING SYSTEMS			
1. STRATEGIC PLANNING	Need for short and long term planning **MID 1999** 3 Years Projections: cashflow, actions to be taken, mgt. comments, yearly SWOT analysis	**MAY 2002** Specific meeting on strategic planning	Minimum outline on strategic planning →
2. BUDGETING STATEMENTS	1 Year Projection: P&L; BS; Cashflow → 3 Years Projection: P&L; BS; Cashflow		
MGT. ACCOUNTING REPORTS	Quarterly mgt. acc. reports → Quarterly mgt. Accounting (Modification)	→	**2003** Monthly mgt. accounts & mgt. accounting reports →
REPORTING SYSTEMS			
QUARTERLY REPORTING	**30 SEPT 1999** -Balance Sheet -Income Statement -Explanatory Notes	→	Detailed explanatory notes →

7.5.3 Other external factors

Competition, Market, Consumer

It was after the 1997 crisis that Minho realized they needed to improve their planning system. Minho's planning system was improved by introducing strategic planning. As described in the preceding section this system has paved the way for Minho's management to focus on the importance of having a long term plan. Yearly SWOT analysis is incorporated as part of this long-term plan. The components of the SWOT analysis, 'strengths', 'weaknesses', opportunity' and 'threats', have demanded a reevaluation of measures in Minho's external factors.

As 90% of Minho's sales are for export, the new planning includes globalization strategies which focus on 'non-traditional' market diversification opportunities. This 'position outside Malaysia' strategy covers the concept of to 'know the customer direct' and not thorough their agents. According to Mr Loo Say Leng, the Director,

> 'Know the customer direct' came about from introduction of the strategic planning system. We discovered that the company was previously nothing more than a supply company. We were not close to the consumer as we were very much at the lower spectrum of the supply chart. Our activities stopped at Port Klang. We needed overseas companies as a network, where latest information on the market and others could be easily obtained.

As a result of this new strategy, several management accounting financial and non-financial performance measures were modified or introduced in internal reports. The market and competition factors underlying these changes are to some extent interrelated and subject to uncertainty. The prior management accounting systems are viewed as unlikely to provide useful indicators and change is needed as the competitive pressure increases. In Minho, as a reaction to globalisation before a decision was made to invest in any of the overseas markets, a new management accounting report which included product price and quality, direct cost and other related overheads costs was prepared. Non- financial measures such as the market segment analysis of sales, construction growth and the potential economic stability were also included. In addition, information on competitors' products, price, quality and others also became an integral part of the report. All the data was analysed before any investing decision in any of the overseas' markets was made.

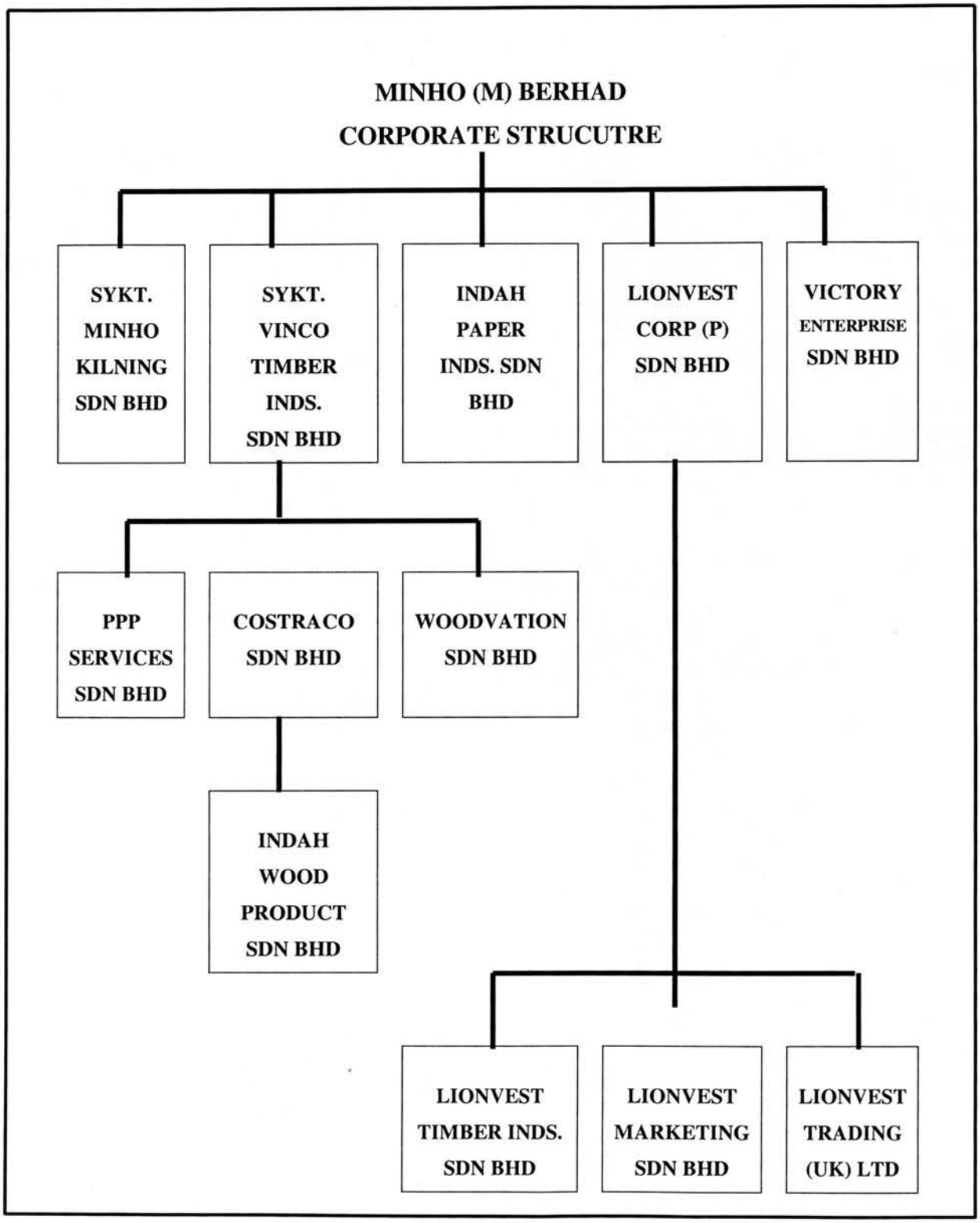
7.5.4 Internal factors

Organisational Structure, Managerial Policies, Problems of Existing Techniques, Deterioration of Financial Performance, Production Technology, Employees

The previous section illustrated how several Minho's management accounting and control systems were influenced by strategies set to address the external factors. These external factors have also affected several of Minho's internal causal factors. Changes in these internal factors in turn changed several of Minho's existing management accounting systems e.g implementation of strategic planning, modification on the budgeting statements and management accounting reports.

For example, as a result of 'knowing the customer direct', market and products diversification strategies, Minho's corporate structure has been restructured and expanded. Minho's new corporate structure after it invested in the overseas subsidiary, Lionvest Trading (UK) Ltd is as follows:

FIGURE 8


MINHO (M) BERHAD
CORPORATE STRUCUTRE
SYKT. MINHO KILNING SDN BHD
SYKT. VINCO TIMBER INDS. SDN BHD
INDAH PAPER INDS. SDN BHD
LIONVEST CORP (P) SDN BHD
VICTORY ENTERPRISE SDN BHD
PPP SERVICES SDN BHD
COSTRACO SDN BHD
WOODVATION SDN BHD
INDAH WOOD PRODUCT SDN BHD
LIONVEST TIMBER INDS. SDN BHD
LIONVEST MARKETING SDN BHD
LIONVEST TRADING (UK) LTD

The expanded corporate structure has resulted in active subsidiaries focusing on the following principal activities:

1. Kiln drying and chemical preservative treatment;
2. Manufacturing, exporting and dealing in moulded timber and its related products;
3. Export of processed timber products;
4. Manufacturing and distribution of industrial paper bags;
5. Trading in log supply and its related products;
6. Exploitation of timber concessions; and
7. The operation of a fully integrated timber complex

Minho refers to each of the principal activities as a division. The development of Minho, through the expansion of its organisation structure caused more information to be reported in the management accounting report. Performances of each of these activities are now provided in each of the relevant subsidiary's management accounting reports, the performance review section. Several management accounting information analyses are provided in this section. These include analyses on the turnover, average selling price, operating profit and production. Comparisons between the current and previous year's results are provided in the turnover, average price and operating profit analyses. A thorough comparison and explanation on production are also provided. Financial measures include: logs sent for cross cutting; logs deduction percentage;

average diameter of logs; total logs and blocks consumed; net production recovery percentage. The non-financial measures include information such as the logging activities, logging problems, log quality and new Government logging rulings.

Before the 1997 crisis, Minho's planning and budgeting policies concentrated on short-term planning. The increased complexity of today's business has exposed Minho to higher risk and has therefore changed some of its managerial policies. Minho's existing one year budgeting and planning systems seemed to be inadequate. The decision to introduce strategic planning in Minho is an attempt to ensure that a comprehensive strategy which takes into account long-term planning is implemented. This policy required active subsidiaries to modify their budgeting statements, profit and loss projections, balance sheet forecasts and cash flow projections from one to three years.

In addition each active subsidiary is also required to include in its strategic planning the three years' projections, steps to be taken to achieve the projections, management comments and the yearly SWOT analysis. This strategic planning however will keep changing as new circumstances arise to ensure consistency with Minho's environmental conditions. Changes were therefore needed in Minho's existing one-year planning system as it was no longer adequate for Minho's current business environment.

The reduction in managerial value of Minho's prior financial performance measures that were based on one year planning was recognised as strategic planning was

introduced. Most of the management accounting reports prepared by the subsidiaries, especially the performance review sections, were therefore changed. More non-financial measures, analyses and explanation were included in these sections. These non-financial measures are a supplement to the conventional financial measures by reporting specifically on such areas as divisions' performance, logs quality, logs measurements, production activities and logging rulings.

A movement towards globalization has forced Minho's employees to broaden their horizons through on-going studies, attending conferences and in-house training. For example, strategic planning was initiated by Minho's employees. Engaging in a strategy of positioning in the global market has also exposed Minho to competitors from other countries, for example, companies producing timber related products using new technology machines. Minho used this information in its production technique and cost structure decisions.

7.5.5 Summary on factors that caused changes

In Minho, management accounting changes are linked to a multiplicity of factors of which some are located primarily within the organisation, some within the environment within which Minho operates and some which straddle Minho and the environment. The Thai devaluation in 1997, the 11th September 2001 disaster and new requirements on

globalization and corporate governance are environmental factors that are located outside Minho. These environmental factors have forced Minho to implement a strategic planning system and SWOT analysis is part of this system. Minho's existing external factors (competition, market, consumers) were therefore reevaluated. Market, consumer and product diversification are the main concerns of the new strategies, while globalization is part of the strategy in market diversification. Consequently, these strategies have demanded new management accounting measures, financial and non-financial.

The environmental factors did not only affect Minho's existing external factors but also the internal factors. It is, however, difficult to determine the relationship between these environmental, external and internal factors. Changes in Minho's external and internal factors seem to have been caused by the environmental factors. Subsequently changes in the external factors required management accounting changes which also required several of the internal factors to change. As the internal factors changed they created further changes in Minho's management accounting system. As a result, several management accounting sub-systems comprising the main system, Planning, Controlling, Costing, Directing and Decision-making, were changed.

Hence the environmental factors (Thai devaluation in 1997, the 11th September 2001 disaster and new requirements on globalization and corporate governance) can be considered to be the 'web' factors over-arching the external and internal factors. These

independent variables strongly influenced the external and internal factors to initiate changes in Minho's management accounting system. The external and internal factors therefore can be identified as playing more of an 'intermediary' role in the changing of Minho's management accounting system, while the 'web' factors acted as the underlying stimulants of these changes.

7.6 RESISTANCE TO CHANGE

This section summarizes how resistance towards the new strategic planning system was minimized in Minho. Initially, Heads of subsidiaries were informed about the need for strategic planning by the Group Accountant and Finance and Accounts Manager (Accounts Team). The Accounts Team demonstrated what was expected from them in the strategic planning process. They were informed of the objectives, importance, difficulties and advantages of implementing strategic planning. In the next stage, representatives from each subsidiary were requested to attend a one and a half day seminar. This seminar was on issues related to the current timber market and was conducted by an external consultant. The intention of this seminar was to expose them to the current potential timber market opportunities and threats. The managers were informed of the need for consolidated action and 'one-direction' among the subsidiaries. All divisions were mentally prepared for and well educated about the new strategic planning before it was implemented. This extensive preparation partly explained the

lengthy duration taken for strategic planning to be implemented. Strategic planning implementation only took place in March 1999 even though the idea was first conceived in 1997.

Strategic planning implementation has required all Minho's subsidiaries to include more financial and non-financial information in their reports. For example three-year budgeting statements were required instead of the previous annual ones. More information and analyses are included in the subsidiaries management accounting reports to the Group. Furthermore, the subsidiaries are also required to prepare and submit more frequent management accounting reports. As a result of the KLSE's new requirements, subsidiaries were required to submit the report on a monthly basis instead of on a quarterly basis. According to Mr Faizal the Finance Manager, the subsidiaries initially faced problems in preparing the reports during the first few quarters. Problems arose as some of the subsidiaries were not familiar with the information required and there was a lack of resources. These problems were minimized however as the subsidiaries were kept well informed and were supported in their efforts by the allocation of more resources.

It can be concluded that there was no major objection or resistance from Minho's subsidiaries on the strategic planning implementation and the increase in reporting frequency. Their policies of informing and educating the staff before a change is implemented contributed to minimizing resistance towards change.

7.7 SUMMARY

Figure 9 summarises the preceding analysis by illustrating Minho's management accounting change process. The elements of the change process are based on the identification of the different change dimensions and the possible causal factors. The two different change dimensions in Minho again indicated that management accounting change is not a homogenous phenomenon. Changes in the strategic planning and budgeting systems involved implementing a new system, while only the information or output was modified for the budgeting systems. These different change dimensions provide one description 'what' management accounting changed.

A number of causal factors were discovered and they could be grouped into environmental, external and internal factors. The overarching environmental factors seem to influence Minho's external and internal factors. The evaluation of these two types of causal factors demonstrates how they initiated changes in Minho's management accounting system through the introduction of a new system of strategic planning and a modification of the budgeting statements. It therefore confirms that management accounting changes can be caused by various factors operating in an interactive manner. The various causal factors contribute to an explanation of 'why' management accounting changes.

Identifying several change dimensions and the causal factors provide one explanation of 'how' Minho's management accounting has developed to its current position. Minho's management accounting system however will keep changing as the surrounding environment changes. The factors causing change in management accounting are, inherently dynamic and this is likely to ensure change will be continuous. This was recognized by Minho staff. According to Mr Faizal the Finance Manager,

> The strategic planning changing process will never stop as the company has to comply with new guidelines and regulations. For example, when internal control was made compulsory by the KLSE, we had to make sure that the proposed strategic planning coincided with and included the internal control elements.

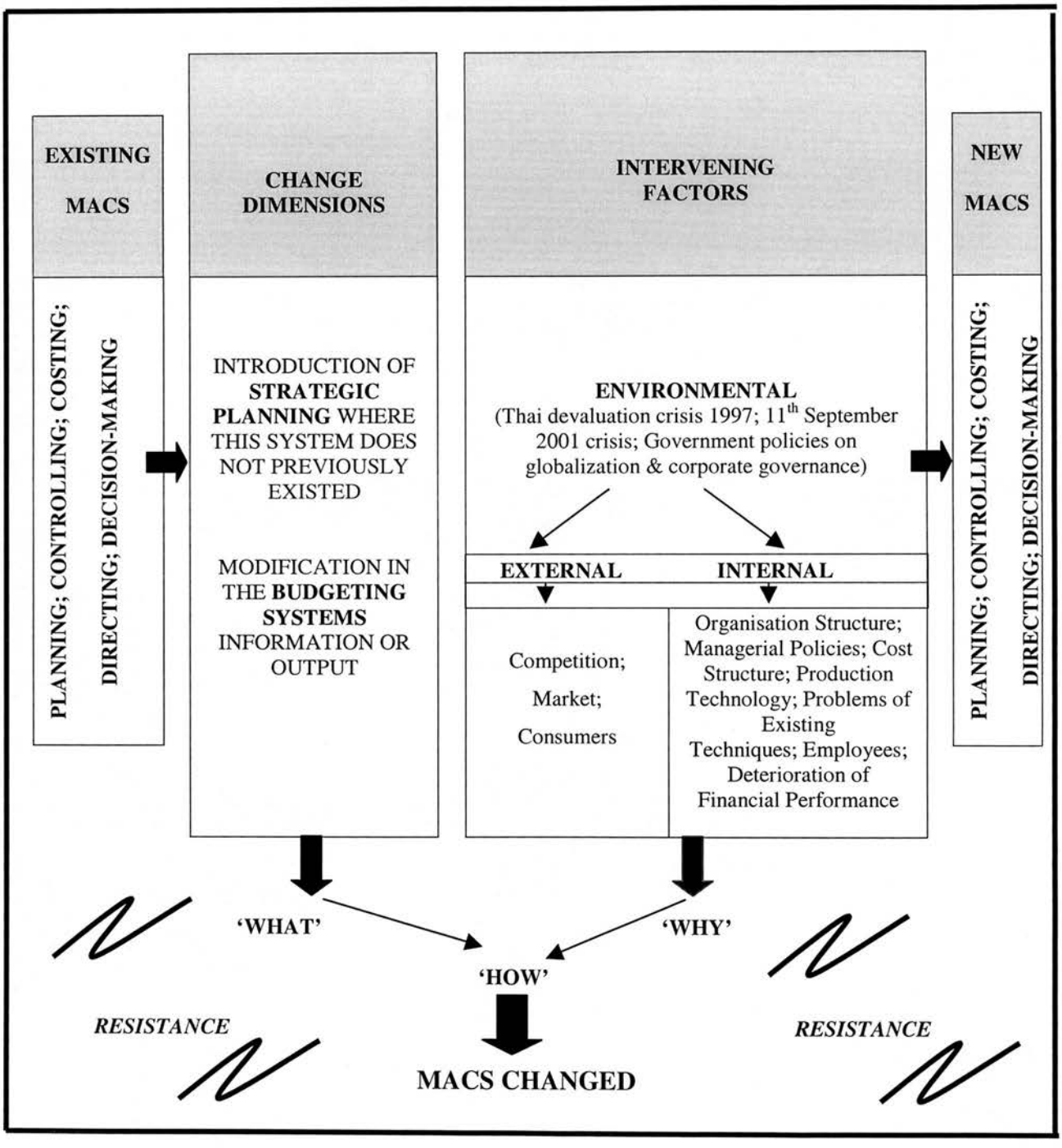
Mr Loo Say Leng the Director supported this view,

> Strategic planning is an evolving process

Minho's management accounting change process also shows that resistance to change can be addressed successfully by appropriate information and education policies.

FIGURE 9

MINHO'S MACS OVERALL CHANGE PROCESS



CHAPTER EIGHT

CONCLUSIONS

8.1 INTRODUCTION

This conclusion reviews the findings of the research work undertaken, highlights its contribution to the literature and its limitations. It also contains a review of how it might provide a constructive foundation for future work. It is therefore designed to highlight the value of the literature review, the empirical work of survey and case study.

8.2 LITERATURE REVIEW

The review of the management accounting change literature provided a basis not only for enhancing understanding of the phenomenon of management accounting change but also for drawing conclusions on work already done. Many of these conclusions provided opportunities which could be exploited in the research design of this study. Gaps and shortcomings in prior research and the experience of others with different theoretical perspectives and methodologies all contributed to this study. The most significant and useful conclusions from the literature review are reviewed below.

First, there is no generally agreed definition of management accounting change. Indeed change in management accounting is frequently used as a research object without any explicit definitional consideration. However an analysis of previous research shows that management accounting change takes quite a variety of forms. Many studies base change analysis on the introduction of new techniques as replacements for the existing ones, others focus on the modification of management accounting information output and still others represent new extensions to the management accounting system. There are very few studies on other possible dimensions of change, for example on the removal of a management accounting technique or system without replacement. Little consideration is given by researchers to an investigation and explanation of these different types of management accounting change or indeed to the implications of these differences for their research. This study explicitly categorises management accounting

changes into different types (see page 9) and this represents one significant new contribution of this research to the existing literature.

Secondly, the existing literature does confirm that the factors that cause management accounting change are numerous and can alter with the theoretical perspective adopted. However while prior research has identified these factors little attempt has been made in the literature to order or structure them. This has been done using a broad contingency theory approach to provide a basis for this study. They can be easily separated into two contingent variable main categories i.e. macro-contextual factors and micro-organisational factors. Macro-contextual factors comprise mainly the external or environmental factors which cause change, while micro-organisational aspects cover factors internal to the organisation being researched. These two main categories are than influenced by 'overarching factors' which comprise the economic, political and social contexts. However, while change factors have been identified the nature of the relationship between them and the management accounting system has lacked detailed specification. For example, it is not clear whether technology affects management accounting directly or through its impact on the organisational structure or indeed whether there is reciprocity in the links between management accounting and the causal factors (Otley, 1980). Research has also been lacking in exact specification of the causal factors. Indeed many different terms have been used by researchers for similar factors. For example, to describe production tecnology, researchers often use other

terms such as technological innovations, high tech products, manufacturing flexibility and technology explosion.

The majority of prior researchers have only implicitly mentioned these factors in their studies. None of the researchers have incorporated all of the identified potential causal factors already identified in the literature in any of their management accounting change studies. Prior studies have focused only on relatively small restricted sets of causal factors. This study contributes by using a more general model of change which incorporates a larger number of change causes as a basis for the empirical research. This provides a sounder basis on which to explain, understand and predict future management accounting change at a general level. Anticipating the need for management accounting change is of practical importance to organisations intending to maintain a high quality of information provision for management.

Thirdly, a fundamental lesson from the literature is that there are many approaches which can be adopted as a research framework for the study of management accounting change. Adopting any one theory can explain only certain aspects of the process on management accounting change in real-life organisations. Thus to this extent all studies can be described as partial. Contingency theory for example, is based on the identification of certain organisational circumtances which have caused or influenced the specific features of an accounting system (and are therefore implicitly implicated in development of change). Environment, technology and organisational structure, are the

core contingent variables. However, contingency theories studies tend to examine the relationship of a contingent factor to management accounting attributes at one point of time. It is therefore a static theory. Understanding the interactions between multiple contingent factors and management accounting in a more dynamic sense could well lead to a less structural and more process or behavioural explanation of change.

Alternatively, economic based frameworks for explaining change include the agency thoery approach and the market vs hierarchies concept. They provide justifications for management accounting system design based on the interaction of economic motives, personal interest, reward systems and organisational form. At a general level they can provide a rationale for the adoption of a range of management accounting techniques e.g. responsibility accounting; budgets; conditional variance investigation policies; cost allocation; participative budgeting; standard costing; and performance evaluation. However these theories do not take into consideration uncertainty, bounded rationality, and institutional complexity. These also assume institutions to be tacit and static. They have not yet been developed to a state where they can explain specific technical change at an operational level and they say little about the detailed aspects of the behavioural processes which result in change.

The above theories have been critised further by critical perspective researchers as they ignore the interrelation between accounting practices and issues of conflict, domination and power. For example in a labour process perspective, understanding the underlying

assumptions about capitalism and the position of labour in an organisation is essential if information change and development is to be understood. Similarly, the Foucaudian perspective situates management accounting in a wider political and social context. This approach reveals management accounting as an element of a general historical process by which people are made calculable and governable. Accounting is viewed as a social practice rather than simply a technique. However this approach assumes ex ante specific motives for change and downplays economic rationality in the business context.

8.2.1 Limitations

While any of these bases may be used in management accounting change research it is impractical for an individual researcher to simultaneously apply them all. A choice has to be made and explained as part of the research process. This study was based on an extended form of contingency thoery which is explained on page 89 and justified on pages (47 – 50; 101). While the work is limited by this choice its contribution is also specified by it.

8.3 SURVEY

The survey results provide considerable support for many aspects of the management accounting change literature review and in particular for the prior research undertaken

by L&W and W&S. Specifically it confirms that MACS are subject to considerable and consistent levels of change. The results indicate that MACS changes are not generally highly resistance to change. This is supported by the fact that 62% of the organizations in this study have not faced any type of management accounting change resistance. The results of this study, the L&W study and the W&S strongly support a trend in MACS changes that does not appear to be resistant to change. This evidence therefore tends to refute Johnson and Kaplan's (1987) claim that management accounting systems are generally very resistant to change (L&W, 1996, p. 145).

Most changes were extensions to the existing systems or a modification of information outputs from continuing systems. Change rates proved to be comparatively high in this Malaysian study possibly because it was undertaken at a time of extreme economic turbulence. The Thai currency devaluation which emerged in early July 1997 contributed to a deep and enduring Malaysian economic recession. A majority of Malaysian organizations operated in these adverse environmental circumstances, and it is likely that the sustained effects of this would have put pressure on them to improve information by changing their MACS. This economic context may also have influenced the pattern of change which was found to be most extensive in the planning and controlling area. Hence it is suggested by the results that planning and controlling become highly dynamic in 'unstable' organizations which face economic turbulence.

There is also confirmation in this study for the L&W and W&S (only on manufacturing sample) findings that organizational capacity to learn was a significant causal factor of MACS change. However in this study the level of competition also proved to be a significant driver of change and this differs from both the L&W and W&S studies (except on the manufacturing sample). Thus this replication of prior work reveals that while change in MACS is, at a general level, a common characteristic of organizational life with some cross-national and cross-time consistencies, the pattern and underlying causes are also particular to the national situation under study.

Extensions of the L&W and W&S studies which were undertaken proved insightful. First, it was shown that changes in MACS were not homogenous events. They could be categorized separately by type, significance and success. Each change dimension attached to each management accounting main system demonstrated different significance and success rates. Change was mostly either replacement or modificatory in nature and different types of change did have different causal factors. 'Modification in the management accounting information or output' was the most common dimension of change. This was followed by the 'Introduction of new techniques as replacement for existing ones'. This study also indicated that 'Removal of management accounting without replacement' has not featured as a type of management accounting change. Each of the change dimensions studied were caused by different causal factors.

Changes in 23 different MACS sub-systems were related to different sets of independent variables. About half (1/2) of the changes in the sub-systems were best predicted by the organizational capacity to learn and a further one fifth (1/5) by the competition intensity faced by the organisation. Only changes in the capital budgeting system can be predicted by the organisational structure while organisation size did not prove to be an influential factor. It can therefore be suggested that management accounting changes located in different sub-areas of the MAS are best explained by a different combination of independent causal factors.

Finally, the introduction of a larger set of causal variables (taken from the change literature) proved to be productive in generating a model with double the explanatory power of the original model developed by L&W and W&S. The larger set of causal variables which comprised ten variables (as opposed to four variables in L&W and W&S) explained 33.6% (Adjusted R^2, R^2 = 41.5%) of the management accounting change as compared to 16% (Adjusted R^2, R^2 = 30%) in L&W's original model and 11% (Adjusted R^2, R^2 = 15%) in the W&S (overall sample) replication. The modified model developed in this study indicated that changes in MACS are best predicted by greater organizational capacity to learn (measured by the number of systems reported to exist), organizational novelty (as shown by a lesser number of years incorporated) and size (with a greater propensity to change in smaller firms). This suggests that 'new' and smaller organizations are exposed to more changes in their MACS. It may be that less resistance to change exists in this type of organisation. Using a larger set of causal

factors and differentiating types of change it was clear that, changes in five MACS main categories and in 23 sub-systems were explained by a different combination of independent causal factors. Thus this supports the proposition that studies which assume change to be a homogeneous event, are not likely to result in a full explanation and understanding of it.

8.3.1 Limitations

Apart from the normal limitations associated with survey research, this replicatory study has additional caveats. First, the replication of the L&W study did not produce a perfect match of independent variables, especially regarding the competition and organizational structure measures. Secondly, this survey period was for five years (1997 – 2001 inclusive) which is two years longer than the period in the L&W study. Since most Asian countries were facing an economic slowdown during this period, this may have increased the rate of change in Malaysian manufacturing organizations. This survey may therefore have overstated the more normal rate of change in management accounting systems. Thirdly, the survey results were based on Malaysian manufacturing organizations and there is no suggestion that these results are applicable to other types of organisations. Fourthly, the respondents may have suffered from memory lapse or from bias in their views (many were likely to be involved in and responsible for change in MACS). Respondents were also required to determine the external and internal factors influential levels on each of the five main MACS. The influential levels were

therefore based on each respondent's individual perceptions. As Anderson and Lanen (1999, p. 391) observe,

> Surveys are fraught with problems associated with measurement error and bias ... it cannot be certain that each respondent exercise care in completing the survey that each respondent was qualified to answer the questions.

Finally, even with an additional six variables the level of variance was only explained to the extent of one third (1/3) by the regression model. Two thirds of the variation in MACS remain unexplained and this suggests that additional unidentified variables could be added to the model. This was a major reason for supplementing the survey with a case study.

8.4 CASE STUDY

The case study was designed to complement the survey and provide greater depth to the analysis of management accounting change and how it is caused. In general the results provide support for the management accounting change literature and survey findings. Two different types of change were discovered in the case study company. These dimensions include the most commonly (modification in the management accounting information or output) and the most rarely found type (implementation of a new systems) of change. This case study has identified that a relationship existed between these two change dimensions in the case study company. Implementation of a

new system of strategic planning by the organisation has directly changed their existing budgeting system and resulted in a modification of information reported in the management accounting reports. New financial and non-financial measures were required and this change was ultimately a result of the new strategic planning system introduced by the company.

The introduction of strategic planning was not a discrete event. It involved several stages and evolved over a period of time. The finance staff played a major role in the initial stage and they acted as the agents of change. Inevitably it was a behavioural process, the contingencies of change acting through their influence on key players and agents of change. Personal commitment to change and avoidance of resistance to change were shown to be critical aspects of the process by which change was affected.

Thus this case study not only reinforced the survey findings, it also offered an explanation of how some of the factors identified in the study influenced changes at different stages of the management accounting change process. Following change or improvement in strategic planning, the organisation evaluated a range of external factors. Subsequently these external factors affected internal factors which, in turn, caused the changes in the MACS. For example, the strategic planning implementation required SWOT analysis to be introduced. New information measures on competition, market and consumer were therefore introduced as part of the management accounting system. This happened in conjunction with alterations in the organizational structure

and in managerial policies. These caused further management accounting change. The process and the cause/effect relationships were thus more complex than a straight forward correlation. This highlights how the survey and related GLM analysis may fail to capture all the intricacies of change. The case study also identified further contingencies which may help to explain change. These were the improved corporate governance requirements, threat of globalization, the Thai's devaluation and 11th September, 2001 crisis.

8.4.1 Limitations

The following limitations of this case study were in addition to the normal limitations on result generalisability. It was longitudinal but its conduct extended only to a period of 4 months and the subject matter required the respondents to rely on their memories (which may inevitably involve inaccuracies) of several prior years' events. The research was based on interviews and document scrutiny. No direct observation of the events was possible.

8.5 FUTURE RESEARCH

This study suggests a number of possibilities for pursuing future research on management accounting change. These comprise further modification to the existing

study design and also new avenues for research. Given the significant changes that have taken place in management and control systems practice over the past decade, there is an extensive scope for research in the area (Otley, 1999, p. 380). First in the former category is the incorporation of a wider range of management accounting change dimensions, additional causal variables and factors causing resistance to management accounting change. It is suggested that additional variables could be added to the model. In addition it may be possible to refine measurements on the different change dimensions, MACS and it sub-systems and the different types of sectors or industries, sizes, national cultures and economic situations that they are facing. It would also be interesting and insightful to specifically compare management accounting change during stable and turbulent conditions within the same setting.

On the latter aspect, future research could focus on alternative theoretical bases for the investigation of change (e.g. agency theory, labour process or institutional theory), on the adoption of alternative research methods (e.g. participant or non participant observation, action research or constructive research) and on the identification of key steps or stages in the management accounting change process and on the roles and significance of individuals actors in this process.

Thus while this study has made several contributions to the already extensive and rapidly growing literature on management accounting change, there remains many challenges and opportunities for future researchers in relation to this important topic.

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QUARTERLY REPORT ON CONSOLIDATED RESULTS FOR THE FINANCIAL PERIOD ENDED

- **31st December 1999**
- **31st March 2000**
- **30th September 2000**
- **30th September 2001**
- **31st March 2002**

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LIST OF APPENDIXES

APPENDIX A

LIST OF SUB-SYSTEMS IN MACS

PLANNING SYSTEMS

1. Budgeting
2. Operations planning (production)
3. Capital budgeting
4. Strategic planning
5. Other planning systems

CONTROLLING SYSTEMS

6. Individual or team-based performance measurement
7. Organizational performance measurement
8. Measurement of performance in terms of quality
9. Measurement of performance in terms of customer satisfaction
10. Other performance measures

COSTING SYSTEMS

11. Direct allocation of manufacturing overhead
12. Direct allocation of marketing costs
13. Direct allocation of other overhead
14. Internal (department or divisional) product transfers
15. Other costing systems

DIRECTING SYSTEMS

16. Reward systems – bonuses
17. Reward systems – pay-for-performance plans
18. Other reward systems

DECISION-MAKING SYSTEMS

19. Information reported more frequently
20. Use of more non-financial measures
21. Information reported more broadly
22. Other changes to reporting systems
23. Other changes to systems that do not appear on this list

Please indicate by ticking (√) the appropriate box, the significance of the influence of internal factors on each of the dimensions of your organisation's management accounting control systems (MACS): planning; controlling; costing; directing and decision making

	NO EFFECT	LITTLE EFFECT	MEDIUM EFFECT	STRONG EFFECT	VERY STRONG EFFECT
E. PROBLEMS OF EXISTING TECHNIQUES					
e.g. inadequate existing methods, declining role of traditional industries, lack of efficiency and capability of the traditional cost					
Planning	☐	☐	☐	☐	☐
Controlling	☐	☐	☐	☐	☐
Costing	☐	☐	☐	☐	☐
Directing	☐	☐	☐	☐	☐
Decision making	☐	☐	☐	☐	☐
F. EMPLOYEES					
e.g. widespread of knowledge, reduction of skilled to simple labour, internal power struggle, reward system					
Planning	☐	☐	☐	☐	☐
Controlling	☐	☐	☐	☐	☐
Costing	☐	☐	☐	☐	☐
Directing	☐	☐	☐	☐	☐
Decision making	☐	☐	☐	☐	☐
G. DETERIORATION OF FINANCIAL PERFORMANCE					
e.g. new evaluation and adopted, need to justify actions, information quality, performance evaluation					
Planning	☐	☐	☐	☐	☐
Controlling	☐	☐	☐	☐	☐
Costing	☐	☐	☐	☐	☐
Directing	☐	☐	☐	☐	☐
Decision making	☐	☐	☐	☐	☐
Any other internal factors?					
Please specify	☐	☐	☐	☐	☐

COVER LETTER - SAMPLE

Date : 24 th September 2001

Senior Management Accountant
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75300 Melaka

SCHOOL *of* MANAGEMENT
ACCOUNTING

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Edinburgh EH8 9JY

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Telephone 0131 650 1000
or direct dial 0131 650
Email

Dear Sir

Survey Titled Management Accounting Change in Malaysia

A small token from Scotland is waiting for you and it only takes fifteen minutes of your precious time.

I am a staff of Faculty of Accountancy, University Technology MARA (UiTM) and currently pursuing my PhD with University of Edinburgh, Scotland, United Kingdom. Management accounting change in Malaysia is the main area of my research. Malaysian manufacturing (industrial and consumer products) listed companies from the main and second board are selected as the sample.

Since the main scope of this survey is on management accounting system change, I would appreciate if an appropriate person (recommended senior management accountant and above and has been in the organisation for not less than 5 years) to fill-up the questionnaire. All of your answers will be confidential and used only for aggregate statistical analysis.

The results of this research will contribute to the understanding on how management accounting of Malaysian companies are responding to changes. These will hopefully help management accountants manage change more effectively in the future.

Please return the completed questionnaire together with your business card for the small token to be sent to using the numbered stamp addressed envelope. I will be glad to send a copy of the survey results if there are required. The three digit numbers on the left hand-side of the envelopes are only for recording purposes.

Your cooperation, precious time and speedy response are highly appreciated in contributing success to this research.

Thank you.

Yours sincerely,

.....

SUZANA SULAIMAN

4. Which of the external factors: competition; market and consumer, influence MACS the most and how?

5. Are there any other external factors (apart from the above) that influence changes in MACS?

6. Which of the internal factors: organisational structure; managerial policies, cost structure; production technology; problems of existing techniques; employees; deterioration of financial performance, most influence change in MACS?

7. Any other internal factors (apart form the above) that influence changes in MACS?

8. How do these factors (identified and others) cause changes? How do people make these changes?

9. Was these any resistance toward these changes? Were the changes due to 'human', 'system' or other factors? Was there a need for an agent of MACS change to get support from the senior management and be part of the process? Were the MACS changes headed by the staff recruited outside the organisation? Were the characteristics of the existing MACS rules and routines easily modified and amendable toward changes? What other resistance factors were experienced during the MACS changes? Can it be minimized and how?

APPENDIX G

PAPERS PUBLISHED AND PRESENTED

1. Akauntan Nasional, Journal of the Malaysia Institute of Accountants (Nov/Dec 2001, p. 26-28)

2. Proceeding paper at the 3rd Conference on New Directions in Management Accounting: Innovations in Practice and Research, Brussels (Dec 2002)

3. Proceeding paper at the 4th ENROAC Workshop on Management Accounting Change, Groningen, The Netherland (May 2003)

SPECIAL YEAREND ISSUE

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MANAGEMENT ACCOUNTING
Change Dimensions

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DEPARTMENT OF ACCOUNTING AND BUSINESS METHODS, UNIVERSITY OF EDINBURGH, SCOTLAND, UK

Introduction

Management accounting change has ecome a topic to be researched by most esearchers in recent years. According to urns and Scapens (2000, p. 3), ".... Man-gement accounting change has be-ome a topic of much debate in recent ears. Whether management account-g has not changed, has changed, or hould change, have all been dis-ussed"

Besides much debate on this topic, anagement accounting change has not een explicitly defined by most re-archers. Change is a general term and respect of most objects, it may there-re address and encompass a variety dimensions. This is evident from the ey aspects of change which are re-ected in the definition of the Concise xford Dictionary, 10th Ed., 1999, p. 235. his definition includes all of the follow-g aspects : making or becoming dif-rent; become new; take or use another stead; alteration or modification of a ew experience; and the substitution of ne thing for another. These aspects rep-sent different types of change and this riety demonstrates that change is not niform phenomenon. It can differ sig-ficantly in its nature, importance and plications. Due to this variability man-ement accounting researchers can poten-lly study very different types of changes. is therefore important for researchers to specific about the type of management counting change on which their work is cused.

Various Management Accounting Change Dimensions

Change involving minor modification of what already exists is unlikely to have the significance which the introduction of a major novel management accounting system component will have. The various dimensions of management accounting change which can be applied to management accounting are categorised in the following ways :

- Introduction of new techniques as replacements for existing ones;
- Introduction of new techniques where no management accounting previously existed;
- Modification in the management accounting information or outputs;
- Modification of the technical nature of a management accounting technique or system; and
- Removal of a management accounting technique or system with no replacement.

Introduction of New Techniques as Replacements for Existing Ones

This relates to situations where a management accounting use is replaced by a new one. A number of researchers have studied change as the progressive replacement of lots of existing management accounting systems. Foster and Ward (1994) considered that management accounting change could be seen as a radical development in innovation where it involves novel replacement of existing procedures. For example, the implementation of an activity-based costing system or the introduction of a totally new set of performance measures such as the balanced score card could be viewed in this way where they replace traditional techniques. Indeed, Anderson (1995, p.1) adopts this concept of management accounting change, "An opportunity to study

the technical and organisational impact of management accounting system changes has emerged with companies' adoption of activity-based costing (ABC)"

According to Innes and Mitchell (1990), the shortcomings, inadequacies and declining role of the traditional management accounting techniques and approaches do underlie the demand for replacement of many aspects of management accounting systems. If these deficiencies are widely recognised and acted upon then this type of change will be relatively common in practice where traditional financial and cost accounting systems do not produce the information that managers require, new cost management systems must be designed and implemented (Miller, 1992).

Other examples of this type of change being researched include :

- the 'switching' from an incremental budgeting system to a Planning, Programming, Budgeting System (PPBS) (Ezzamel, 1994) by a university;
- the replacement of one conventional investment technique, Net Present Value (NPV) with a Strategic Cost Management approach in evaluating technology investment opportunities (Shank, 1996); and
- the introduction of sophisticated capital budgeting techniques such as discounted cash flow and risk analysis as replacement of the non-discounting techniques (Klamer and Walker, 1984).

Introduction of New Techniques Where No Management Accounting Previously Existed

This involves the extension of the management accounting system by the introduction of new (to the organisation) techniques. It relates to the *initial* development of new management accounting and therefore may relate to the early stages of organisational development. Several researchers have viewed management accounting change as a more discrete event by considering it to be the introduction of a new technique or system where none previously existed in the company or organisation. This definition has been adopted by Vamosi (2000), in his study of the introduction and use of new techniques such as cost estimates for price calculation and cashflow management in a newly privatised company. The new competitive context of the firm required prompt supplementation of the existing management accounting. As a result of these, scientific management (Armstrong, 1985), and similar techniques such as cost-benefit analysis (Edwards and Newell, 1991) and value-for-money (Cobb, Helliar and Innes, 1995) were introduced. This type of novel change can also arise from the introduction of new managerial policies. For example, the new management accounting supporting policies introduced by companies for cost reduction, cost control, production location and product quality.

Modification in the Management Accounting Information or Outputs

This involves using existing management accounting systems but amending their information outputs. Management accounting change can also incorporate modification in the content or presentation of information or outputs produced as opposed to changes in techniques. As noted by Cobb, Helliar and Innes (1995), new features in the presentation could include key performance indicators and ratios such as return on risk weighted capital.

While, Vaivio (1999, p. 409), highlights the need for this change as, "It has been claimed that financial measurements should be complemented with 'new' non-financial indicators and companies are being advised to erect multi-dimensional measurement systems".

According to him a company adopting a new strategy and concept such as Total Quality Management also requires new measures. Further, supplement measurements on productivity and performance are also required in achieving the company's new manufacturing goals, (Kaplan, 1983). These new strategies could be viewed as revolutionising management accounting change, as they require additional financial measures.

Revolution in management accounting change is when regular management accounting reports are modified to include a set of systematised non-financial measures. Similarly, in Amat, Carmona and Roberts (1994), adopting new technologies and making strategic changes was found to require more non-financial information for performance measurement and assessment. Non-financial measures were previously needed, as most non-financial managers poorly understood the financial figures. These ideas are supported by the Burns, Ezzamel and Scapens (1999) survey, which concluded that considerable change has taken place but change in the way management accounting is used, rather than change in management accounting systems and techniques.

Modification of the Technical Nature of a Management Accounting Technique or System

This involves a modification of the techniques representing the existing management accounting system that exists in the organisation. It would include, for example, the alteration of overhead absorption from labour hours to a machine time basis or the revision of a normal loss allowance in an organisation's costing system. Management accounting change can be viewed as the modification of the existing management accounting technique or system. For example, the modification on the manner of overhead allocation was found in Kaplan's (1986) study. Overhead allocations were modified from a 'lump cost' basis of collection and allocation to a process of collection and allocation on a disaggregated basis. In the same pilot study, a modification also occurred in the allocation of costs to activities by changing from a simplistic basis using direct labour hours to a more normalised complex measure of output due to using the more advanced technology. The replacement of allocation overhead from direct labour to a more suitable method in today's scenario can also be seen in Brimson, (1986). This suitable method is necessary, as nowadays there is little cause-effect relationship between labour and overheads. Similar modification of conventional overhead rates to the direct charging of overhead to components or products can also be found in the Innes and Mitchell (1990). This has resulted in the development of a cost allocation 'methodology' which is based on cost drivers. As noted by Cobb, Helliar and

Innes (1995), this cost allocation 'methodology' is to minimise the possibility of arbitration in the cost allocations.

Modification of the existing management accounting system is essential in this dynamic business world. In this phenomena, a company may have to change its organisation structure as a means of enhancing the effectiveness of its budgetary control (Bruns and Waterhouse, 1975) or modify the budgeting setting process (Cobb, Helliar and Innes, 1995). In this dynamic and competitive world, a company may also need to modify its product costing system. For example, from marginal to total product costing method (Edwards and Newell, 1991) or improving product costing practices (Granlund, 2001).

Removal of a Management Accounting Technique or System with no Replacement

Change need not simply involve adding to the management accounting system. Management accounting change can also be reductionist where the elimination and non-replacement of a management accounting technique occurs. An example of this would be the removal of traditional budgeting with no budgetary type replacement The need for the removal can be linked closely to the nature of the production technology and when the production costs become relatively less significant. For example, in one US study part of the existing cost accounting systems that were designed to collect data that no longer existed or no longer used by management were removed to eliminate the cost of maintaining them. No replacement was made of these obsolete systems (Turney and Anderson, 1989)

The above management accounting changes can take place in a variety of 'formats'. Changes can be to part or the entire management accounting technique, system or process. Changes could also take place in the whole or only in several parts of the company. For example, management accounting changes could be introduced through pilot studies before fully implementing them throughout the organisation. Innes and Mitchell (1995) confirmed through survey evidence that this latter approach has been a widespread way of introducing change, in the form of activity-based costing, in the UK's largest companies. Similarly, the development of a new production and control system (PCCS) was also achieved initially in a pilot study form in one of Scapens and Roberts, (1993) case study companies.

Conclusion

There is no homogeneous management accounting definition of management accounting change probably, because such change may take many focuses. There is a variety of types of change, which could be applied to management accounting. An analysis of previous research shows that the most frequent studies are on the introduction of new techniques as replacements for the existing ones, the modification in the management accounting information/outputs and the technical nature of a management accounting technique/system. There are very few studies on the other possible definitions especially on the removal of a management accounting technique or system without replacement. It also shows that there is little consideration given by the researchers to the explanation of different types of management accounting change and to the implications of these differences for their research. Moreover most of the definitions of management accounting change are implicit rather than explicit and this perhaps explains the lack of attention to change definition.

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Part 2 (2)

Management accounting change in Malaysian manufacturing organizations

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Abstract

This is a study of management accounting control system (MACS) changes in Malaysian manufacturing organizations. It both replicates and extends the MACS change model developed in Libby and Waterhouse's (1996) exploratory study in Canadian manufacturing firms and in Williams and Seaman (2001) Singapore study. Comparisons are made between two studies and the Malaysian results. The analysis confirms that most changes in MACS are incremental or evolutionary rather than revolutionary. The great variety of changes and causes demonstrates that management accounting change is not a uniform phenomenon as is often implicitly assumed in the literature. The introduction of several new independent variables (change causal factors) does improve the model's explanatory power significantly.

1. Introduction

It is not surprising that in the quest to understand management accounting in a real world setting, change has increasingly become a focus for research. The dynamics of the discipline provide a rich setting for the identification of the forces which influence and explain practice. As Burns & Scapens (2000, p.3) observe,

> ".... management accounting change has become a topic of much debate in recent years. Whether management accounting has not changed, has changed, or should change, have all been discussed."

While the existence and extent of management accounting change is thus central to this type of research, so too are the factors underlying change. The origins or causes of management accounting change have been studied from a variety of perspectives using a range of different research methods (Innes & Mitchell, 1990; Jones, 1985a, 1985b; Baiman, 1982; Namazi, 1985; Williamson, 1979; Ezzamel & Hart, 1987; Boyns *et al.*, 1999; Burns *et al.*, 1999; Hopper *et al.*, 1987; Miller & O'Leary, 1994). This paper focuses on the identification of the factors which cause change in management accounting at the level of the individual firm. It is based on the replication and extension of the Canadian survey of Libby & Waterhouse (1996) (hereafter, L&W). The replication facilitates comparison of the causes of management accounting change in Canada, Malaysia (where this study was conducted) and Singapore [where a prior replication was undertaken by Williams & Seaman (2001) (hereafter, W&S)]. The extension adds two refinements to these two earlier studies. Both are designed to add to the explanatory

power of the prior research. First, this study recognizes that a practical definition of change in management accounting has been avoided by researchers (Quattrone & Hopper, 2001). Different categories of change, reflecting variation in nature and relative significances are introduced in this study (see section 2, Table 1 below). Second, the range of external causal factors have been augmented by a number of internal factors suggested in the growing literature on management accounting change. Thus the normal assumptions of change as a uniform or homogeneous phenomenon driven by exogenous variables are modified in this study. This extension thus supplements the empirical explanation of management accounting change found in these two earlier studies.

The remainder of the paper is organized as follows. The empirical survey data and methods are introduced in Section 2. Comparison of the Malaysian results with the L&W and W&S studies are presented in Section 3. Section 4 extends the L&W study to include analyses of the five change dimensions, their significance and success, potential influential factors and modified MACS model. The L&W MACS regression change model was used to re-analyse the five change dimensions and the 23 management accounting and control sub-systems. Finally, Section 5 presents the conclusions of the study.

2. Data and methods

Questionnaire

The questionnaire on management accounting change in a manufacturing organisation was structured to obtain information relating to organisation background, management accounting function, different change dimensions and factors influencing change. Five dimensions of management accounting change were used in the questionnaire. They are as follows:

Table 1
Different dimensions to measure MACS changes[1]

	Management accounting change dimensions
0	No change
1	Introduction of new techniques as replacements for existing ones
2	Introduction of new techniques where no management accounting previously existed
3	Modification in the management accounting information or outputs
4	Modifications of the technical nature of a management accounting technique or system
5	Removal of a management accounting technique or system with no replacement

The respondents located changes, categorized in the above dimensions, that had taken place in their 23 management accounting and control sub-systems (refer Appendix A). Respondents were also asked to add any other type of MACS sub-system (other than the

[1] A thorough review of management accounting change literature showed that there are different types of change and this variety demonstrates that change is not a uniform phenomenon.

23 listed). The overall level of significance and of success[2] of any change that has taken place on the five MACS also had to be indicated by the respondents. The factors influencing change in management accounting comprised: external and internal factors,[3] help respondent understanding examples were given for each of these factors[4]. Significance and success levels were selected from a row of five ordinal significance levels ranging from 'no effect' to 'very strong effect'. Variable measurement was achieved as follows:

The dependent variables: Change in MACS

L&W measured the dependent variable, the number of changes in MACS, by measuring the sum of the reported number of changes during a three-year period (1991-1993). A similar measure is adopted. A pilot study conducted on six Malaysian manufacturing organizations however showed that respondents had difficulty in recalling the year in which changes occurred. Prior literature analysis and pilot study comments indicated that MACS changes can take the form of a process and evolve over several years. It is therefore difficult to locate the precise year in which the changes actually took place. A five-year period (1997 – 2001) was selected as the Asian financial crises of 1997 had began to effect the Malaysian economy[5] and the longer time period thus fully encompassed this turbulent economic event.

Independent variables

The independent variables were grouped into external and internal variables. There are three and nine factors grouped into external and internal variables, respectively. Only those factors with asterisk (*) are used in L&W and W&S studies. This study however, not only modified some of the measurement of these variables (competition and organisation structure) but also extended the independent variables. These additional variables were also extended their use by taking into account their different levels of influence on each MACS. They were measured on the basis of each respondent's perception of the influence level between the (external and internal) factors and each of the MACS dimensions: planning, controlling, costing, directing, decision-making. As each factor covers a wide definition, respondents were provided with examples discovered from literatures to aid their understanding (refer to Table 2). The influence level for each organisation is measured by the average of the five MACS (planning; controlling; costing; directing and decision-making) influential level.

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[2] The rates of significance and success related to each of the five MACS (Planning; Controlling; Costing; Directing; Decision-making). This is to minimize confusion while completing the questionnaire.

[3] External factors consist of: Competition; Market; Consumers. Internal factors consist of: Organisation structure; Managerial policies; Cost structure; Production technology; Problems of existing techniques; Employees; Deteriorating financial performance.

[4] Examples were based on many different terms used by researchers for similar intervening factors (refer to Table 2).

[5] Malaysian Economic Outlook, Malaysian Institute of Research (2001)

This study however adopted similar measures as used in L&W and W&S for the remaining, size and capacity to change factors. The number of employees working for an organization and the number of systems that existed in the last year of the study are used to define size and capacity to change, respectively.

TABLE 2
INDEPENDENT VARIABLES USED

	DEFINITION (different terms used by researchers for similar variable)	**MEASUREMENT**
EXTERNAL VARIABLES		
* Competition	Quality improvement; cost minimization, internal competition; lower cost technology; waste reduction	Five influential levels ranging from 0 (no effect) to 5 (very strong effect)
Consumers	Product innovation; customer demands; dissatisfied customers	
Market	Market excellence (quality, delivery. flexibility); market globalization & pressures	
INTERNAL VARIABLES		
* Organisation structure	Level of decentralization	Five influential levels ranging from 0 (no effect) to 5 (very strong effect)
Managerial policies	Corporate expansion; change in strategies; restructuring	
Cost structure	Change in product cost; increase in loss-making; financial pressures; increase in capital investment	
Production technology	Innovation; high-tech process; shorter product life-cycle; change in production process	
Problems of existing techniques	Inadequate existing methods; declining role of traditional industries; lack of efficiency and capability of the traditional cost	
Employees	Widespread of knowledge; reduction of skilled to simple labour; internal power struggle	
Deteriorating financial performance	New ecaluation and adopted; need to justify actions; information on quality; performance evaluation	
* Size	Number of employees working	Number of employees
* Capacity to change	Organizational capacity to learn	Number of systems exist in the last year of the study

Sample description

Malaysian manufacturing companies were used as the population for this study. For several reasons management accounting change is likely to occur in this type of company. Manufacturing companies are exposed to changes in the manufacturing environment which has been considered as a driver of management accounting change. For example, the movement from direct labour to machine hours (Brimson, 1986), changes in the production cost structure (Innes and Mitchell, 1990; Kaplan, 1986) and new high technological manufacturing techniques (Kaplan, 1983). Due to these developments manufacturing companies are also commonly associated with new approaches and techniques. For example, activity-based-costing (ABC) (Anderson, 1995; Anderson and Young, 1999; Shields, 1995), strategic cost management (SCM) (Shank, 1996), changes in management accounting system (Amat *et al.*, 1994), total quality management (Vaivio, 1999) and transfer pricing (Boyns *et al.*, 1999) were introduced in manufacturing companies. Furthermore, most of the prior studies on management accounting change have also selected manufacturing companies in their surveys (Libby and Waterhouse, 1996), field (Kaplan, 1983; Innes and Mitchell, 1990) and case studies (Kaplan, 1986; Turney and Anderson, 1989; Scapens and Roberts, 1993; Amat *et al.*, 1994; Anderson, 1995; Shank 1996; Burns and Scapens, 2000).

Listed manufacturing companies were identified from the Kuala Lumpur Stock Exchange (KLSE). As at 9th October 2001, there were 360 manufacturing organisations in both the main and second board. However, through careful KLSE web-sites surfing, forty-two organizations were excluded due to Malaysian Restructuring Schemes. Therefore, the final sample included was 318 manufacturing organizations. Some 95 (main board = 36; second board = 56)[6] of the organizations responded to the questionnaire and three of these were incomplete. This generated a 28.9% (92/318) response rate.[7,8]

[6] Main and second board organizations are listed organizations which are categorized according to their issued and paid-up share capital, shareholding spread and historical profit performance

[7] A 28.93% response rate is considered acceptable, it compares favourably with that of other Malaysian [Yee (2001); Sori *et al.* (2001a,b,c); Ismail et al., (2001)] and Western [Innes & Mitchell (1995); Mitchell *et al.* (2000); Green & Amenkhienan (1992)]

[8] Three procedures were utilized to check response bias. First, descriptive statistics and cross-correlation coefficient were analysed on the final sample which was dichotomized in terms of size (main and second board). Secondly, descriptive statistics and correlation coefficient were conducted on the sample which was partitioned into two groups, according to early and late responses. Lastly, analysis of the different management accounting change dimensions and the influential (external and internal) factors on the early and late responses was carried out. There was no major difference in all procedures, therefore non-response bias did not appear to be problematic.

3. Replication of prior studies: Descriptive statistics Statistical analysis of results

The causal variables, number of changes, correlation of change and regression results of this study's are compared against L&W and W&S.

Causal Variable Measures

Table 3 shows that the means of the competition, organisation structure and organizational capacity to learn variables for all the three studies were approximately at the middle of their respective ranges. Competition and organisation structure were measured on a different basis in this study (see above) thus giving rise to very different absolute values for these variables. The number of changes was also markedly higher in this study although to a large extent this reflects the fact that the study covered a five-year period. Size, as indicated by the mean number of employees, was similar although this study's higher standard deviation indicates a wider range of sizes.

Table 3
Descriptive statistics comparisons

	Mean	Standard Deviation	Observed Range	Theoretical Range
Libby & Waterhouse (1996) (n=24)				
Number of changes	4.46	3.98	0 – 15	0 - 23
Competition	16.59	3.83	8.38 – 22.24	5 – 25
Decentralization	37.50	38.50	7.21	15 – 75
Size	876	2337.09	25 – 12600	$\supseteq$ 100
Organisational capacity	13.10	4.67	1 - 20	0 - 23
Williams & Seaman[9] (2001) (n= 93)				
Number of changes	3.70	3.77	0 – 17	0 - 23
Competition	17.90	3.37	8 - 24	5 – 25
Centralization	74.68	7.98	49 - 90	23 - 115
Size	784	1536.30	100 - 8000	X $\supseteq$ 100
Organisational capacity	12.10	5.09	1 - 23	0 - 23
This study (2002) (n= 92)				
Number of changes	9.51	5.11	0 – 17	0 - 23
Competition	2.52	0.76	0 – 4	0 – 5
Organisation structure	2.26	0.95	0 – 5	0 – 5
Size	889	3011	17 $\subseteq$ x $\supseteq$ 28,112	X $\supseteq$ 100
Organisational capacity	16.17	2.33	0 - 20	0 - 23

[9] W&S replicated and extended the study by L&W using a Singaporean, multiple economic sectors sample (manufacturing industrial and service organizations) and also utilize Hofstede's cultural framework to extend MACs change across different national cultures.

Number of changes

The L&W and W&S studies in table 4 show a total of 107 (1991 – 1993) and 344 (1995 – mid 1997) changes respectively during the three-year period of their studies. These studies suggest that, on average, each organization changed its MACS components 4.46 and 3.70 times, respectively. This study however, shows a total of 875 changes during its five-year period (1997 – 2001) with each organization changing its MACS on average 9.51 times. Thus this study's respondents exhibited a considerably greater propensity to change [average annual changes were 1.49 (L&W), 1.23 (W&S) and 1.90 (this study)]. This difference is apparent in the markedly higher volumes of changes in all of the sub-systems except directing.

Table 4: MACS changes frequency comparison

MANAGEMENT ACCOUNTING AND CONTROL SYSTEMS (MACS)	LIBBY & WATERHOUSE (1996)			WILLIAMS & SEAMAN (2001)			THIS STUDY (2002)		
	NO.	%	RANK	NO.	%	RANK	NO.	%	RANK
Planning	17	16.0	3	86	25.0	2	241	27.5	1
Controlling	32	30.0	2	79	23.0	3	221	25.3	2
Costing	13	1.0	4	34	10.0	5	162	18.5	4
Directing	11	10.0	5	52	15.0	4	60	6.9	5
Decision-making	34	32.0	1	93	27.0	1	191	21.8	3
	107	100		344	100		875	100	
N	24			93					
Average number of changes	4.46			3.70			9.51		

The rankings of these sub-systems based on relative change volumes have a broad similarity. The first three ranks are taken by the same sub-systems (planning, controlling, decision-making) in all of the studies while the same can be said of the bottom two rankings (costing and directing).

Correlates of change

The L&W study indicated that MACS are more dynamic in organizations that experience high degrees of competition. In contrast the W&S study suggested that the number of component changes in MACS were associated with a more centralized organizational structure. The following Table 5 contains Pearson correlation matrices for the measured variables in this study. The relevant Cronbach alpha reliabilities for the variables with multiple measures (competition and organization structure) appear in the diagonal cells.

Table 5
THIS STUDY (2002)
Correlations and Reliabilities matrix (n=92)

Variable	1	2	3	4	5
1. Number of changes	NA				
2. Competition	0.336**	**0.909**			
3. Organization structure	0.280**	0.574**	**0.933**		
4. Size	0.079	0.005	-0.058	NA	
5. Organisational capacity	0.253*	-0.075	-0.009	0.049	NA

MACS, management accounting and control systems
* $p < 0.05$
** $p < 0.01$
Cronbach alpha reliabilities appear in the diagonal cells

A review of the correlation matrix indicates that the intensity of competition, level of organizational structure and the organizational capacity to learn are all significantly related to the number of changes. These relationships suggest that MACS designs are influenced by a high degree of competition, more decentralized organization structure and a greater capacity to learn. The independent variables, in general, are not significantly correlated except for competitiveness and organizational structure ($r = 0.574$, $p < 0.01$). This suggests that more factors are implicated in MACS change in this Malaysian study. This could reflect the longer timescale of the study (5 as opposed to 3 years). It may also be indicative of the turbulent economic situation in which the study took place.

Regression analysis results

The following regression model and General Linear Model (GLM)[10] were used to test the hypothesized relationships between the dependent and independent variables.

$$\mathbf{NCHANGE} = \alpha_0 + \beta_1\mathbf{COMP} + \beta_2\mathbf{ORG.STRUC} + \beta_3\mathbf{SIZE} + \beta_4\mathbf{CAP}\ ^{11}$$

The results contained in Table 6 shows that the four independent variables together explain a markedly higher percentage of the volume of MACS change (20.4%) than the

[10] GLM has been adopted in this study while multiple regressions were used by both the L&W and W&S studies. http://trochim.human.cornell.edu/kb/genlin.htm. & http://www.statsoft.com/textbook/stglm.html. stated that GLM underlies most of the statistical analyses that are undertaken in applied social research. The GLM allows the researcher to summarize a wide variety of research outcomes. There are several ways in which the GLM differs from the multiple regression model. It permits the analysis of linear combinations of multiple dependent variables, dealing with redundant predictor variables and recoded categorical predictor variables. The major limitations of multiple regressions are overcome by the GLM.

[11] NCHANGE = Number of changes in MACS; COMP = Intensity of competition (+); ORG. STRUC = Organisation structure (+); SIZE = ln (number of employees) (+); CAP = Organisational capacity to learn (+)

prior studies of L&W (16%) and W&S (11%). In order to assess whether the independent variables were associated with changes to each of the components of MACS, give separate regressions were run (Table 6).

Change in the overall MACS was best predicted by organizational capacity to learn and centralization in the L&W and W&S studies, respectively while only decision-making and planning systems, showed significant and similar results to the overall regression.

In this study, one influential variable differed from the previous studies. Competition rather than centralization was significant while organizational capacity to learn was again found significant (see Table 6). Four of the five MACS components (the exception being costing) showed significant results. While planning and controlling had the same two significant variables, in directing and decision-making only the organisational capacity to learn was a significant variable and none of the variable.

Table 6
THIS STUDY (2002)
Regression Analysis Results (n = 92 manufacturing organisations)

VARIABLE	TOTAL	PLANNING	CONTROLLING	COSTING	DIRECTING	DECISION-MAKING
COMPETITION	1.935*	0.552*	0.699**		0.243	0.276
ORGANISATION STRUCTURE	0.809	0.320	0.0069		0.0582	0.109
SIZE	0.0001	0.00004	0.00004		0.00005	0.00003
ORGANISATION CAPACITY	0.606**	0.664**	0.751**	n/s	0.462**	0.646**
R - SQUARE	0.242	0.303	0.229		0.167	0.206
ADJ.R- SQUARE	0.204	0.268	0.190		0.125	0.166
F	6.386**	8.701**	5.940**		4.003**	5.175**

*p < 0.05; **p < 0.01; n/s = not significant

4. STATISTICAL ANALYSIS OF RESULTS: EXTENSION OF PRIOR STUDIES

This section extended prior studies by analyzing MACS changes into different dimensions, their significance and success. A regression model was used to test the hypothesized relationships between each MACS change dimension, 23 sub-systems and the four independent variables. A modified MACS model was thus developed from a further analysis on the potential factors and used on the five MACS and change dimensions.

(a). MACS change dimensions: significance and success levels

It is implicit in the use of the number of MACS changes in the L&W and W&S studies that change is a homogeneous factor. It does not therefore, take account of different types of management accounting change. This study has been designed to allow for different types of management accounting change (refer to Table 1). Table 7 below shows each management accounting change dimension and their associated significance and success levels.

Table 7: Management accounting change dimensions: Frequency, significance and success (n = 92)

Management accounting dimensions	Frequency	%	Average Rating	
			Significance	Success
1. Introduction of new techniques as replacement for existing ones	325	37.1	0.313**	0.157
2. Introduction of new techniques where no management accounting previously existed	122	13.9	0.019	0.184
3. Modification in the management accounting information or output	326	37.3	0.264*	0.336**
4. Modification of the technical nature of a management accounting technique or system	102	11.7	0.134	0.265*
5. Removal of a management accounting technique or systems with no replacement	0	0	n/s	n/s
TOTAL	**875**	**100**		

*p < 0.05, **p < 0.01, n/s = not significant

Significance is when the changes are important and required by the organisation. Not all significant changes are however rated as successful. Each change dimension can either be significant or success, or both. Different significance and success levels are attached to each change dimension. Change through the 'Introduction of new techniques as replacement for existing ones' seems to be very significant ($r = 0.313$, $p < 0.01$) but less successful. While change through the 'Modification in the management accounting information or output' was very successful ($r = 0336$, $p < 0.01$) and significant ($r = 0.264$, $p < 0.05$) to the organisation. However changes through 'Modification of the technical nature of a management accounting technique or system' seem successful ($r = 0.265$, p 0.05) but less significant. Hence, the changes in MACS differed significantly not only in character but also in organizational impact.

(b). General Linear Model (GLM): MACS change dimensions

The following equation was used to test the hypothesized relationships between each MACS change dimension and the independent variables listed below:

$$\text{CHANDIMEN}^{12} = \alpha_0 + \beta_1\text{COMP} + \beta_2\text{ORG.STRUC} + \beta_3\text{SIZE} + \beta_4\text{CAP}$$

Table 8 shows that only 'Modification in the management accounting information or output' of the change dimensions has similar results as the total change in MACS. This suggests that modification in the management accounting information or output was mostly associated with more intensely competitive environments. In contrast, the four independent variables do not seem to be significant in predicting changes in the other types of MACS change. Alternative explanatory factors need to be sought for these types of change.

Table 8: GLM Analysis Matrix
MACS change dimensions and independent variables

		MACS CHANGE DIMENSIONS (refer to table 1)				
VARIABLE	TOTAL	1	2	3	4	5
COMPETITION	1.935*			1.653**		
ORGANISATION STRUCTURE	0.809			0.282		
SIZE	0.0001			0.00016		
ORGANISATION CAPACITY	0.606**	n/s	n/s	0.203	n/s	n/s
R - SQUARE	0.242			0.183		
ADJ.R- SQUARE	0.204			0.142		
F	6.386**			4.483		

*p < 0.05, **p < 0.01, n/s = not significant

(c). GLM and MACS 23 sub-systems

The following regression model was used to test the hypothesized relationships between the 23 MACS sub-systems and the four independent variables listed below.

$$\text{CHANSUBS}^{13} = \alpha_0 + \beta_1\text{COMP} + \beta_2\text{ORG.STRUC} + \beta_3\text{SIZE} + \beta_4\text{CAP}$$

The General Linear Model (GLM) was used to carry out regression analysis on changes in each MACS sub-system. The analysis is summarized and compared against the total change in MACS.

[12] CHANDIMEN = Number of changes in each MACS change dimensions
[13] CHANSUBS = Number of changes in MACS sub-systems

Table 9: Regression Analysis Matrix
Significant sub-systems and independent variables

VARIABLE	SFE TOTAL	PLANNING BUDGETING	OPERATIONS CONTROL (PRODUCTION)	PRODUCT QUALITY	CUSTOMER SERVICE	DECISION MAKING INFORMATION REPORTED MORE BROADLY
COMPETITION	1.935*	0.195**	0.167*	0.246**	0.190*	0.141*
ORGANISATION STRUCTURE	0.809	0.0399	0.0742	-0.0135	-0.0258	0.00503
SIZE	0.0001	0.000005	0.000011	0.000009	0.000012	0.000009
ORGANISATION CAPACITY	0.606**	0.166*	0.153*	0.228**	0.203**	0.279**
R - SQUARE	0.242	0.225	0.218	0.271	0.164	0.219
ADJ.R- SQUARE	0.204	0.186	0.179	0.235	0.123	0.180
F	6.386**	5.813**	5.587**	7.442**	3.935**	5.614**

*p < 0.05, **p < 0.01, n/s = not significant

Table 9 shows that consistent results were apparent for all the sub-systems and the overall change in the MACS. A higher Adj. R^2 (23.5%) than the overall results (20.4%) was obtained in the product quality sub-system.

(d). Correlations between external and internal factors and the changes in MACS

Management accounting change literature provides evidence that MACS change in response to a variety of factors. These factors can be broadly categorized as external and internal to the organisation. In addition to size and capacity to learn variables, L&W only included competition (external) and organisation structure (internal) factors in their study. This study however extended the analysis by including other possible influential factors on the five MACS and not on each of their sub-systems. Table 10 below shows correlations between the number of changes in MACS and each of the external and internal factors.

Table 10: Correlation between number of changes in MACS and the external and internal factors

	External factors	Internal factors
Variable	**1**	**1**
1. Number of changes in MACS	NA	NA
2. Competition	0.336**	
3. Market	0.379**	
4. Consumer	0.335**	
5. Organisation structure		0.280**
6. Managerial policies		0.290**
7. Cost structure		0.280**
8. Production technology		0.314**
9. Problems of existing techniques		0.196
10. Employees		0.272**
11. Deterioration of financial performance		0.310**

*p < 0.05; **p < 0.01

The external independent variables seem to generally have a highly significant correlation with change in MACS. The relationships between these variables indicate that MACS change more in organizations that are exposed to a dynamic market environment, are concerned with their capacity to meet consumer needs and are experiencing a high degree of competition. Similarly, all the internal variables, except problems of existing techniques, have a highly significant correlation with the number of changes in MACS. Relationships between these variables indicate that MACS change depends on the different types of organizational design adopted. However, management accounting change due to organisation structure is 'incomplete' without relating it to organisation managerial activities and policies. Organisation with continuous improvement on activities and policies requires relevant information for the organisation to plan, manage and control. Cost- conscious organizations also demand frequent changes in management accounting. They are concerned specifically with the identification and accumulation of cost which provides much of the basis information required in planning, decision-making and control.

The table shows that organisations which are characterised by adopting new and high technology manufacturing techniques are susceptible to MACS change. There is also evidence that MACS change can be initiated and encouraged by the organisation's employees. Most employees have been exposed to new MACS techniques through their previous jobs and education, attending seminars or reading published literature. Finally the introduction of these new techniques is correlated with deteriorating financial performance. New information generation may therefore be a reaction to poor performance.

These relationships suggest that these independent variables are part of a MACS change regression model.

(e). GLM on potential factors

In the L&W study, a combination of four variables (competition; organisation structure; size; organizational capacity to learn) when regressed against the number of MACS changes produced an Adj. R^2 of 0.16. Therefore there are other variables which must explain the remaining 84% (100% - 16%) of the observed changes in MACS. Some other causal variables were included in this study[14] in an attempt to find a more robust explanation of MACS change. Each of these new factors was added independently to the existing model and their F-values, R^2 and Adj. R^2 are summarized in Tables 11.

Several of the new factors enhanced the model by increasing the R^2 and Adjusted R^2 (see Table 11). None of these factors are from the management accounting functions category.

Table 11: GLM Analysis Matrix

VARIABLES	TOTAL	ORGANISATION BACKGROUND		EXTERNAL FACTORS		INTERNAL FACTORS	
	1	2	3	4	5	6	7
COMPETITION	1.935*	1.935*	1.823*	1.935*	1.712*	1.893*	1.753*
ORGANISATION STRUCTURE	0.809		0.461	0.809	0.235	0.597	0.498
SIZE	0.0001	- 0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
ORGANISATION CAPACITY	0.606**	0.606**	0.605**	0.606**	0.594**	0.574**	0.551*
1. ORGANISATION CATEGORY		-2.349*					
2. AGE			0.113**				
3. MARKET				1.365			
4. CONSUMERS					1.177		
5. PRODUCTION TECHNOLOGY						1.020	
6. DETERIORATION OF FINANCIAL PERFORMANCE							0.737
R - SQUARE	0.242	0.290	0.317	0.257	0.258	0.265	0.254
ADJ.R- SQUARE	0.204	0.245	0.274	0.210	0.211	0.218	0.207
F	6.386**	6.447**	7.332**	5.469**	5.483**	5.683**	5.387**

*p < 0.05, **p < 0.01, n/s = not significant

GLM was used to test the hypothesized relationships between the dependent (number of changes in MACS) and all the above independent variables. All the variables fulfill the

[14] The following for factors were used: (1) Organisation background consists: organisation category; type of sector; country of origin; turnover; capital employed; age. (2) Management accounting functions consist: qualified management accountants; number of new management accountants; change in the chief management accountants. (3) External factors include: competition; market; consumers. (4) Internal factors include: organisation structure; managerial policies; cost structures; production technology; problem of existing techniques; employees; deterioration of financial performance.

requirements of the GLM very well[15]. The modified MACS model is therefore as follows:

$$NCHANGE = \alpha_0 + \beta_1 COMP + \beta_2 ORG.STRUC + \beta_3 SIZE + \beta_4 CAP + \beta_5 AGE + \beta_6 TYPE + \beta_7 MARKET + \beta_8 CONS + \beta_9 PRODTECH + \beta_{10} DETER$$

Where:

NCHANGE	=	Number of changes in MACS
COMP	=	Intensity of competition (+)
ORG.STRUC	=	Org. structure (decentralization) (+)
SIZE	=	ln (number of employees) (+)
CAP	=	Organizational capacity to learn (+)
AGE	=	Number of years organization incorporated (-)
TYPE	=	Organisation category (-)
MARKET	=	Market (+)
CONS	=	Consumer (+)
PRODTECH	=	Production technology (+)
DETER	=	Deterioration of financial performance (+)

The R^2 and Adjusted R^2 for this modified model are 41.5% and 33.6%, respectively. This suggests that 33.6% of the number of changes in MACS is explained by the ten factors[16].

(f). Analysis on modified MACS model

The modified model is used to further analyse all the five MACS (planning, controlling, costing, directing, decision-making) and the five change dimensions. GLMs were run based on the following modified models:

$$\text{(1). } NCHMACS[17] = \alpha_0 + \beta_1 COMP + \beta_2 ORG.STRUC + \beta_3 SIZE + \beta_4 CAP + \beta_5 AGE + \beta_6 TYPE + \beta_7 MARKET + \beta_8 CONS + \beta_9 PRODTECH + \beta_{10} DETER$$

---

[15] Univariate analysis of variance, parameter estimates for the dependent and independent variables, residual plot, Kolmogorov-Smirnov test of normality and Variance Inflation Factor (VIF) tests were conducted.

[16] There were negative relationship between the number of changes in MACS and the number of years the organisation is incorporated and the category in which the organisation is located. This suggests that the number of changes in MACS are more in the 'new' rather than 'earlier' incorporated organizations. Organisations in this study were grouped based on their number of issued and paid-up capital, shareholding spread and profit performance. In general, main board organizations are larger than the second board organizations. The negative relationships suggest that there are more changes in MACS in the smaller as compared to larger organizations. The number of changes in MACS and the other eight factors seem to positively related. This suggests that MACS changes depends upon the degree of competition, level of organisation structure, number of employees, number of systems exist, the market in which the organisation operates, their capacity to meet consumer needs, adopting new and high technology manufacturing techniques and deteriorating financial measures.

[17] NCHMACS = Number of changes in Planning/ Controlling/ Costing/ Directing/ Decision-making

(2). CHANDIMEN[18] = α_0 + β_1COMP + β_2ORG.STRUC + β_3SIZE + β_4CAP + β_5AGE+ β_6TYPE + β_7MARKET + β_8CONS + β_9PRODTECH + β_{10}DETER

The GLM results (see Table 12) of model (1) above reveals enhanced the R^2 and Adjusted R^2 for the five components of MACSs. However none of the five MACS are similar to the overall GLM results. Both organizational capacity to learn and number of years incorporated show statistically significant coefficients for planning and decision-making components. Changes in the other systems are best predicted by the organizational capacity to learn.

Table 12: Modified MACS Model
Management accounting and control systems and independent variables

VARIABLE	MODIFIED MODEL	PLANNING	CONTROLLING	COSTING	DIRECTING	DECISION MAKING
1. COMPETITION	1.018	0.315	0.764	-0.274	0.159	0.0672
2. ORGANISATION STRUCTURE	-0.284	-0.0228	-0.211	-0.0339	-0.0681	-0.0094
3. SIZE	0.00009	0.00003	0.00004	0.00004	0.00005	0.000015
4. ORGANISATION CAPACITY	0.680**	0.632**	0.804**	0.604*	0.430*	0.755**
5. AGE	-0.119**	-0.036**	-0.0252*	-0.0225	-0.0044	-0.0297**
6. TYPE	-2.590**	-0.477	-0.504	-0.926*	-0.378	-0.274
7. MARKET	1.172	0.107	0.281	0.571	0.0894	0.102
8. CONSUMER	0.419	0.218	-0.394	0.224	0.0949	0.275
9. PRODUCTION TECHNOLOGY	0.816	0.171	0.417	0.110	0.191	-0.0254
10. DETERIORATION OF FINANCIAL PERFORMANCE	0.319	0.287	-0.178	0.228	-0.0564	0.0472
MODIFIED MODEL						
R - SQUARE	0.415	0.476	0.317	0.238	0.242	0.338
ADJ.R- SQUARE	0.336	0.405	0.224	0.135	0.139	0.248
F	5.259**	6.729**	3.431**	2.316*	2.361*	3.777**
ORIGINAL MODEL						
R – SQUARE	0.242	0.303	0.229	n/s	0.167	0.206
ADJ. R – SQUARE	0.204	0.268	0.190		0.125	0.166

*p < 0.05
**p < 0.01

The GLM results of model (2) above are shown in Table 13. None of the MACS change types are similar to the overall GLM results. The model is not significant and cannot be

[18] CHANDIMEN = Number of changes in each MACS change dimensions

associated directly with all the MACS change dimensions except changes through 'Modification in the management accounting information or output'.

Table 13: Modified MACS Model
MACS change dimensions and independent variables

VARIABLE	PRODUCTION MODEL			MACS CHANGE DIMENSIONS		
1. COMPETITION	1.018			0.741		
2. ORGANISATION STRUCTURE	-0.284			0.356		
3. SIZE	0.00009			0.00009		
4. ORGANISATION CAPACITY	0.680**			0.231		
5. AGE	-0.119**			-0.0609		
6. TYPE	-2.590**			0.253		
7. MARKET	1.172			0.729		
8. CONSUMER	0.419	n/s	n/s	0.737	n/s	n/s
9. PRODUCTION TECHNOLOGY	0.816			-0.502		
10. DETERIORATION OF FINANCIAL PERFORMANCE	0.319			-0.0849		
MODIFIED MODEL						
R - SQUARE	0.415			0.249		
ADJ.R- SQUARE	0.336			0.148		
F	5.259**			2.456*		
ORIGINAL MODEL						
R - SQUARE	0.242			0.183		
ADJ.R- SQUARE	0.204			0.142		

*p < 0.05, **p < 0.01, n/s = not significant

5. CONCLUSIONS

This study provides considerable support for the prior research undertaken by L&W and W&S. In particular it confirms that MACS are subject to considerable and consistent levels of change. Indeed change rates proved to be highest in this Malaysian study possible because it was undertaken at a time of extreme economic turbulence. The pattern of change across the sub-sections of MACS was also different with more change occurring in planning and controlling and less in costing and decision-making. In addition there is confirmation for the L&W finding that organizational capacity to learn was a significant causal factor of MACS change but the W&S finding that change was closely linked to the degree of centralization was not apparent. The level of competition also proved to be a significant driver of change and this was not found by either L&W or W&S. Thus this replication of prior work reveals that while change in MACS is, at a

general level, a common characteristic of organizational life with some cross-national and cross-time consistencies, the pattern and underlying causes are also particular to the situation under study.

Extensions of the L&W and W&S works proved insightful. First, it was shown that changes in MACS were not homogenous events. They could be categorized separately by type, significance and success. Second, change was mostly either replacement or modificatory in nature and different types of change did have different causal factors. Thus studies which assume change to be homogeneous event, are not likely to result in a full explanation and understanding of it. The introduction of a larger set of causal variables (taken from the change literature) proved to be productive in generating a model with double the explanatory power of the original model. However this still leaves two-thirds of the variation in MACS to explain. The identification of further causal factors and the understanding of why the importance of certain factors differ in alternative settings are thus important for future challenges raised by this type of study.

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APPENDIX A
LIST OF SYSTEMS IN MACS

Planning systems

1. Budgeting
2. Operations planning (production)
3. Capital budgeting
4. Strategic planning
5. Other planning systems

Controlling systems

6. Individual or team-based performance measurement
7. Organizational performance measurement
8. Measurement of performance in terms of quality
9. Measurement of performance in terms of customer satisfaction
10. Other performance measures

Costing systems

11. Direct allocation of manufacturing overhead
12. Direct allocation of marketing costs
13. Direct allocation of other overhead
14. Internal (department or divisional) product transfers
15. Other costing systems
16. Reward systems – bonuses
17. Reward systems – pay-for-performance plans
18. Other reward systems

Decision making systems

19. Information reported more frequently
20. Use of more non-financial measures
21. Information reported more broadly
22. Other changes to reporting systems
23. Other changes to systems that do not appear on this list

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MANAGEMENT ACCOUNTING CHANGE IN MALAYSIAN MANUFACTURING ORGANISATIONS

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Abstract

This is a study of management accounting control system (MACS) changes in Malaysian manufacturing organizations. It both replicates and extends the MACS change model developed in Libby and Waterhouse's (1996) exploratory study in Canadian manufacturing firms and in Williams and Seaman (2001) Singapore study. Comparisons are made between these two studies and the Malaysian results. The analysis confirms that most changes in MACS are incremental or evolutionary rather than revolutionary. The great variety of changes and causes demonstrates that management accounting change is not a uniform phenomenon as is often implicitly assumed in the literature. The introduction of several new independent variables (change causal factors) does improve the original model's explanatory power significantly.

First, this study recognizes that a practical definition of change in management accounting has been avoided by researchers (Quattrone & Hopper, 2001). Different categories of change, reflecting variation in nature and relative significance are introduced in this study (see section 2, Table 1 below). Second, the range of external causal factors have been augmented by a number of internal factors suggested in the growing literature on management accounting change. Thus the normal assumptions of change as a uniform or homogeneous phenomenon driven by exogenous variables are modified in this study. This extension thus supplements the empirical explanation of management accounting change found in these two earlier studies.

The remainder of the paper is organized as follows. The empirical survey data and methods are introduced in second section. Comparison of the Malaysian results with the L&W and W&S studies are presented in the following section. This followed by an extension on L&W study which include analyses of the five change dimensions, their significance and success, potential influential factors and modified MACS model. Finally, the conclusions of the study are presented.

to be indicated by the respondents. Moreover respondents were asked to identify the factors influencing these changes. External and internal factors,[4] influencing change were listed to facilitate response. Significance and success levels were selected from a row of five ordinal significance levels ranging from 'no effect' to 'very strong effect'. Variable measurement was achieved as follows:

The dependent variables: Change in MACS

L&W measured the dependent variable, the number of changes in MACS, by measuring the sum of the reported number of changes during a three-year period (1991-1993). A similar measure was adopted in this study. A pilot study conducted on six Malaysian manufacturing organizations, however, showed that respondents had difficulty in recalling the year in which changes occurred. Prior literature analysis and pilot study comments indicated that MACS changes can take the form of a process and evolve over several years. It is therefore difficult to locate the precise year in which the changes actually took place. A five-year period (1997 – 2001) was selected as the Asian financial crises of 1997 had began to effect the Malaysian economy[5] and this longer time period which fully encompassed this turbulent economic event was used to provide a longer temporal location for change.

[4] External factors consist of: Competition; Market; Consumers. Internal factors consist of: Organisation structure; Managerial policies; Cost structure; Production technology; Problems of existing techniques; Employees; Deteriorating financial performance. To help understanding examples of each of these factors were given on the questionnaire. These were based on many different terms used by researchers for similar intervening factors (see Table 2). Respondents were also given the opportunity to include other factors of their choice.

[5] Malaysian Economic Outlook, Malaysian Institute of Research (2001)

TABLE 2
INDEPENDENT VARIABLES USED

EXTERNAL VARIABLES	DEFINITION (different terms used by researchers for similar variable)	MEASUREMENT
* Competition	Quality improvement; cost minimization, internal competition; lower cost technology; waste reduction	Five influential levels ranging from 0 (no effect) to 5 (very strong effect)
Consumers	Product innovation; customer demands; dissatisfied customers	
Market	Market excellence (quality, delivery. flexibility); market globalization & pressures	
INTERNAL VARIABLES		
* Organisation structure	Level of decentralization	Five influential levels ranging from 0 (no effect) to 5 (very strong effect)
Managerial policies	Corporate expansion; change in strategies; restructuring	
Cost structure	Change in product cost; increase in loss-making; financial pressures; increase in capital investment	
Production technology	Innovation; high-tech process; shorter product life-cycle; change in production process	
Problems of existing techniques	Inadequate existing methods; declining role of traditional industries; lack of efficiency and capability of the traditional cost	
Employees	Widespread of knowledge; reduction of skilled to simple labour; internal power struggle	
Deteriorating financial performance	New ecaluation and adopted; need to justify actions; information on quality; performance evaluation	
* Size	Number of employees working	Number of employees
* Capacity to change	Organizational capacity to learn	Number of systems exist in the last year of the study

organizations were excluded due to Malaysian Restructuring Schemes. Therefore, the final sample included was 318 manufacturing organizations. Some 95 (main board = 36; second board = 56)[6] of the organizations responded to the questionnaire and three of these were incomplete. This generated a 28.9% (92/318) response rate.[7,8]

3. Replication of prior studies: Descriptive statistics

Statistical analysis of results

The causal variables, number of changes, correlation of change and regression results of this study's are compared against L&W and W&S.

Causal Variable Measures

Table 3 shows that the means of the competition, organisation structure and organizational capacity to learn variables for all the three studies were approximately at the middle of their respective ranges. Competition and organisation structure were measured on a different basis in this study (see above) thus giving rise to very different absolute values for these variables. The number of changes was also markedly higher in

[6] Main and second board organizations are listed organizations which are categorized according to their issued and paid-up share capital, shareholding spread and historical profit performance

[7] A 28.93% response rate is considered acceptable, it compares favourably with that of other Malaysian [Yee (2001); Sori *et al.* (2001a,b,c); Ismail et al., (2001)] and Western [Innes & Mitchell (1995); Mitchell *et al.* (2000); Green & Amenkhienan (1992)]

[8] Three procedures were utilized to check response bias. First, descriptive statistics and cross-correlation coefficient were analysed on the final sample which was dichotomized in terms of size (main and second board). Secondly, descriptive statistics and correlation coefficient were conducted on the sample which was partitioned into two groups, according to early and late responses. Lastly, analysis of the different management accounting change dimensions and the influential (external and internal) factors on the early and late responses was carried out. There was no major difference in all procedures, therefore non-response bias did not appear to be problematic.

9.51 times. Thus this study's respondents exhibited a considerably greater propensity to change [average annual changes were 1.49 (L&W), 1.23 (W&S) and 1.90 (this study)]. This difference is apparent in the markedly higher volumes of changes in all of the sub-systems except directing.

Table 4: MACS changes frequency comparison

MANAGEMENT ACCOUNTING AND CONTROL SYSTEMS (MACS)	LIBBY & WATERHOUSE (1996)			WILLIAMS & SEAMAN (2001)			THIS STUDY (2002)		
	NO.	%	RANK	NO.	%	RANK	NO.	%	RANK
Planning	17	16.0	3	86	25.0	2	241	27.5	1
Controlling	32	30.0	2	79	23.0	3	221	25.3	2
Costing	13	1.0	4	34	10.0	5	162	18.5	4
Directing	11	10.0	5	52	15.0	4	60	6.9	5
Decision-making	34	32.0	1	93	27.0	1	191	21.8	3
	107	100		344	100		875	100	
N	24			93					
Average number of changes	**4.46**			**3.70**			**9.51**		

The rankings of these sub-systems based on relative change volumes have a broad similarity. The first three ranks are taken by the same sub-systems (planning, controlling, decision-making) in all of the studies while the same can be said of the bottom two rankings (costing and directing).

Correlates of change

The L&W study indicated that MACS are more dynamic in organizations that experience high degrees of competition. In contrast the W&S study suggested that the number of component changes in MACS were associated with a more centralized organizational

Regression analysis results

The following regression model and General Linear Model (GLM)[10] were used to test the hypothesized relationships between the dependent and independent variables.

$$NCHANGE = \alpha_0 + \beta_1 COMP + \beta_2 ORG.STRUC + \beta_3 SIZE + \beta_4 CAP$$ [11]

The results contained in Table 6 shows that the four independent variables together explain a markedly higher percentage of the volume of MACS change (20.4%) than the prior studies of L&W (16%) and W&S (11%). In order to assess whether the independent variables were associated with changes to each of the components of MACS, separate regressions were run (Table 6).

Change in the overall MACS was best predicted by organizational capacity to learn and centralization in the L&W and W&S studies, respectively, while only decision-making and planning systems, showed significant and similar results to the overall regression.

In this study, one influential variable differed from the findings of these previous studies. Competition rather than centralization was significant while organizational capacity to

[10] GLM has been adopted in this study while multiple regressions were used by both the L&W and W&S studies. http://trochim.human.cornell.edu/kb/genlin.htm. & http://www.statsoft.com/textbook/stglm.html. stated that GLM underlies most of the statistical analyses that are undertaken in applied social research. The GLM allows the researcher to summarize a wide variety of research outcomes. There are several ways in which the GLM differs from the multiple regression model. It permits the analysis of linear combinations of multiple dependent variables, dealing with redundant predictor variables and recoded categorical predictor variables. The major limitations of multiple regressions are overcome by the GLM.

[11] NCHANGE = Number of changes in MACS; COMP = Intensity of competition (+); ORG. STRUC = Organisation structure (+); SIZE = In (number of employees) (+); CAP = Organisational capacity to learn (+)

(a). MACS change dimensions: significance and success levels

It is implicit in the use of simply the number of MACS changes as an aggregated dependent variable in the L&W and W&S studies that change is a homogeneous factor. It does not therefore, consider the effects of different types of management accounting change. This study has been designed to allow for different types of management accounting change (refer to Table 1). Table 7 below shows each management accounting change dimension and their associated significance and success levels.

Table 7: Management accounting change dimensions:
Frequency, significance and success (n = 92)

Management accounting dimensions	Frequency	%	Average Rating	
			Significance	Success
1. Introduction of new techniques as replacement for existing ones	325	37.1	0.313**	0.157
2. Introduction of new techniques where no management accounting previously existed	122	13.9	0.019	0.184
3. Modification in the management accounting information or output	326	37.3	0.264*	0.336**
4. Modification of the technical nature of a management accounting technique or system	102	11.7	0.134	0.265*
5. Removal of a management accounting technique or systems with no replacement	0	0	n/s	n/s
TOTAL	**875**	**100**		

*p < 0.05, **p < 0.01, n/s = not significant

These ratings emphasized the heterogeneous nature of MACS change. Change through the 'Introduction of new techniques as replacement for existing ones' seems to be very significant ($r = 0.313$, $p < 0.01$) but less successful. While change through the 'Modification in the management accounting information or output' was very successful

Table 8: GLM Analysis Matrix
MACS change dimensions and independent variables

		MACS CHANGE DIMENSIONS (refer to table 1)				
VARIABLE	**TOTAL**	**1**	**2**	**3**	**4**	**5**
COMPETITION	1.935*			1.653**		
ORGANISATION STRUCTURE	0.809			0.282		
SIZE	0.0001			0.00016		
ORGANISATION CAPACITY	0.606**	n/s	n/s	0.203	n/s	n/s
R - SQUARE	0.242			0.183		
ADJ.R- SQUARE	0.204			0.142		
F	6.386**			4.483		

*p < 0.05, **p < 0.01, n/s = not significant

(c). GLM and MACS 23 sub-systems

The following regression model was used to test the hypothesized relationships between the 23 MACS sub-systems and the four independent variables listed below.

$$\text{CHANSUBS}^{13} = \alpha_0 + \beta_1\text{COMP} + \beta_2\text{ORG.STRUC} + \beta_3\text{SIZE} + \beta_4\text{CAP}$$

The General Linear Model (GLM) was used to carry out regression analysis on changes in each MACS sub-system. The analysis is summarized and compared against the total change in MACS.

[13] CHANSUBS = Number of changes in MACS sub-systems

Table 10: Correlation between number of changes in MACS and the external and internal factors

	External factors	Internal factors
Variable	**1**	**1**
1. Number of changes in MACS	NA	NA
2. Competition	0.336**	
3. Market	0.379**	
4. Consumer	0.335**	
5. Organisation structure		0.280**
6. Managerial policies		0.290**
7. Cost structure		0.280**
8. Production technology		0.314**
9. Problems with existing techniques		0.196
10. Employees		0.272**
11. Deterioration of financial performance		0.310**

*p < 0.05; **p < 0.01

The external independent variables seem to generally have a highly significant correlation with change in MACS. The relationships between these variables indicate that MACS change more in organizations that are exposed to a dynamic market environment, are concerned with their capacity to meet consumer needs and are experiencing a high degree of competition. Similarly, all the internal variables, except problems with existing techniques, have a highly significant correlation with the number of changes in MACS. Relationships between these variables indicate that MACS change depends on the different types of organizational design adopted. However, management accounting change due to organisation structure is 'incomplete' without relating it to the organisation's managerial activities and policies. Organisation with continuous improvement of activities and policies requires relevant information for the organisation to plan, manage and control. Cost- conscious organizations are also more likely demand frequent changes in management accounting. They are concerned specifically with the

explanation of MACS change. Each of these new factors was added independently to the existing model and their F-values, R^2 and Adj. R^2 are summarized in Tables 11.

Several of the new factors enhanced the model by increasing the R^2 and Adjusted R^2 (see Table 11). None of these factors are from the management accounting functions category.

Table 11: GLM Analysis Matrix

VARIABLE	TOTAL	ORGANISATION BACKGROUND		EXTERNAL FACTORS		INTERNAL FACTORS	
		1	2	3	4	5	6
COMPETITION	1.935*	1.935*	1.823*	1.935*	1.712*	1.893*	1.753*
ORGANISATION STRUCTURE	0.809		0.461	0.809	0.235	0.597	0.498
SIZE	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
ORGANISATION CAPACITY	0.606**	0.606**	0.605**	0.606**	0.594**	0.574**	0.551*
1. ORGANISATION CATEGORY		-2.349*					
2. AGE			0.113**				
3. MARKET				1.365			
4. CONSUMERS					1.177		
5. PRODUCTION TECHNOLOGY						1.020	
6. DETERIORATION OF FINANCIAL PERFORMANCE							0.737
R - SQUARE	0.242	0.290	0.317	0.257	0.258	0.265	0.254
ADJ.R- SQUARE	0.204	0.245	0.274	0.210	0.211	0.218	0.207
F	6.386**	6.447**	7.332**	5.469**	5.483**	5.683**	5.387**

*p < 0.05, **p < 0.01, n/s = not significant

GLM was used to test the hypothesized relationships between the dependent (number of changes in MACS) and all the above independent variables. All the variables fulfill the requirements of the GLM very well[15]. The modified MACS model is therefore as follows:

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factors include: organisation structure; managerial policies; cost structures; production technology; problem with existing techniques; employees; deterioration of financial performance.

[15] Univariate analysis of variance, parameter estimates for the dependent and independent variables, residual plot, Kolmogorov Smirnov test of normality and Variance Inflation Factor (VIF) tests were conducted.

possibly because it was undertaken at a time of extreme economic turbulence. This economic context may also have influenced the pattern of change across the sub-sections of MACS which was also different with more change occurring in planning and controlling and less in costing and decision-making. In addition there is confirmation for the L&W finding that organizational capacity to learn was a significant causal factor of MACS change but the W&S finding that change was closely linked to the degree of centralization was not apparent. The level of competition also proved to be a significant driver of change and this was not found by either L&W or W&S. Thus this replication of prior work reveals that while change in MACS is, at a general level, a common characteristic of organizational life with some cross-national and cross-time consistencies, the pattern and underlying causes are also particular to the national situation under study.

Extensions of the L&W and W&S works proved insightful. First, it was shown that changes in MACS were not homogenous events. They could be categorized separately by type, significance and success. Second, change was mostly either replacement or modificatory in nature and different types of change did have different causal factors. Moreover changes in different MACS sub-systems were better explained by different sets of independent variables. Thus studies which assume change to be homogeneous event, are not likely to result in a full explanation and understanding of it. The introduction of a larger set of causal variables (taken from the change literature) proved to be productive in generating a model with double the explanatory power of the original model. However this still leaves two-thirds of the variation in MACS to explain. The identification of further causal factors and the understanding of why the importance of certain factors

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APPENDIX A

LIST OF SYSTEMS IN MACS

Planning systems

1. Budgeting
2. Operations planning (production)
3. Capital budgeting
4. Strategic planning
5. Other planning systems

Controlling systems

6. Individual or team-based performance measurement
7. Organizational performance measurement
8. Measurement of performance in terms of quality
9. Measurement of performance in terms of customer satisfaction
10. Other performance measures

Costing systems

11. Direct allocation of manufacturing overhead
12. Direct allocation of marketing costs
13. Direct allocation of other overhead
14. Internal (department or divisional) product transfers
15. Other costing systems
16. Reward systems – bonuses
17. Reward systems – pay-for-performance plans
18. Other reward systems

Decision making systems

19. Information reported more frequently
20. Use of more non-financial measures
21. Information reported more broadly
22. Other changes to reporting systems
23. Other changes to systems that do not appear on this list

APPENDIX H

MALAYSIA: OVERALL ECONOMIC PERFORMANCE

	1995	1996	1997	1998	1999	2000	2001
GDP and major components (% change, year over year, except for noted)							
Nominal GDP (level in billion US$)	88.7	100.9	100.2	72.5	79	89.7	87.5
Real GDP	9.8	10.0	7.3	-7.4	6.1	8.3	0.4
Consumption	10.5	5.6	4.6	-10.0	6.3	9.9	4.7
Private Consumption	11.7	6.8	4.3	-10.2	3.3	12.2	2.8
Government Consumption	6.1	0.7	5.7	-8.9	18.5	1.7	11.9
Investment	22.8	8.2	9.2	-4.3	-5.9	24.1	-2.1
Private Investment	28.1	11.3	9.4	-55.2	-21.8	28.7	-19.7
Government Investment	11.3	0.5	8.4	-8.4	15.9	19.9	15.5
Export of Goods and Services	19.0	9.2	5.5	0.5	13.4	16.1	-7.6
Import of Goods and Services	23.7	4.9	5.8	-18.8	10.8	24.2	-8.6
Fiscal and external balances (% of GDP)							
Budget balance	0.8	0.7	2.4	-1.8	-3.2	-5.8	5.5
Merchandise Trade Balance	0.04	4.0	3.7	24.4	28.7	23.3	21.0
Current Account Balance	-9.7	-4.4	-5.9	13.2	16	9.4	8.3
Financial Account Balance	0.0	0.0	0.0	0.0	-8.4	-7.0	-4.5
Economic indicators (% change, year over year, except as noted)							
GDP Deflator	3.6	3.7	3.5	8.5	0.0	4.7	-2.7
CPI	3.4	3.5	2.7	5.3	2.8	1.6	1.4
M2	24.0	19.8	22.7	1.5	13.7	5.2	2.1
Three-month Interbank Rate (% p.a., end-period)	6.76	7.39	8.7	6.46	3.18	3.25	3.27
Unemployment Rate (%)	3.1	2.5	2.4	3.2	3.4	3.1	3.7
Population (millions)	20.8	21.3	21.8	22.1	22.7	23.3	23.8

Source: Malaysian Economic Outlook, Malaysian Institute of Research